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# FOOD INDUSTRIES

## ● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

eapple-nut confection
de in Hawaii for Army

OCTOBER 1945

Salaries for Food Technologists

The Vacreator—A Versatile Tool

Fumigation To Avoid Insect Damage

New Know-how Aids Cheese Makers

The Annual Wage—Threat or Promise?

Compression Solves Ration Problems

How To Recover Tartrate in Winery

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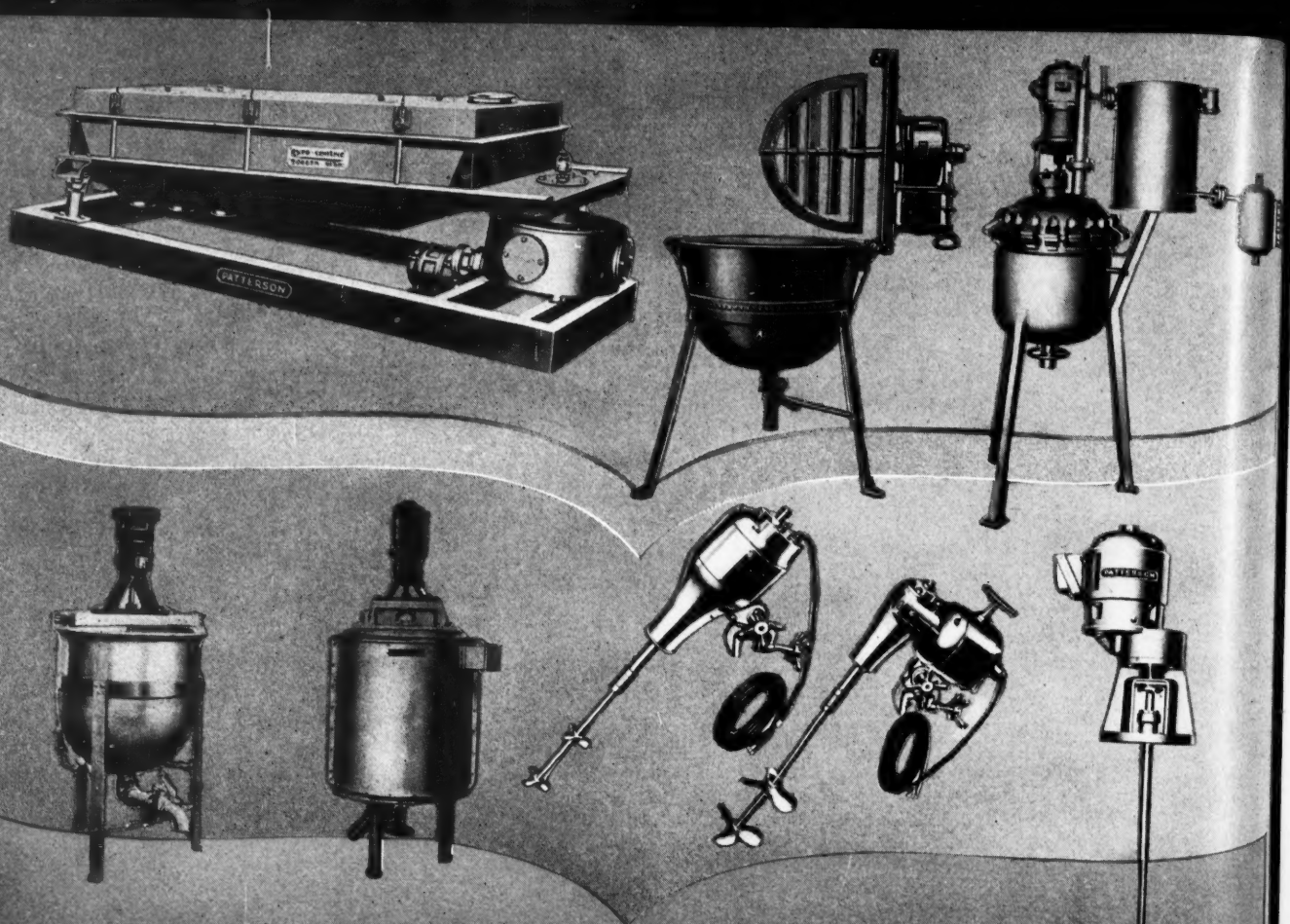

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To help meet the demand in the armed forces for nutritious confections, Hawaiian Pineapple Co. developed a new candy which could be made from materials that were readily available. It is a pineapple bar covered with nuts. The picture on the cover shows the candy on an inspection belt at the end of the manufacturing process. (Photo by Dee Bredin).

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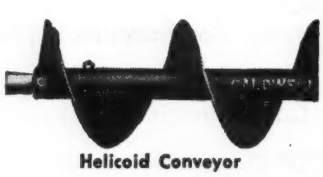

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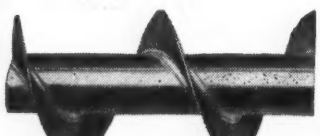

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Typical Link-Belt Screw Conveyor, with part of cover removed to show flighting.

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**COMPACT:** take less space than other types of conveyors; no return run.

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# The Fault Is Our Own

THE view expressed by President Truman to the effect that all of us must bear a large share of the blame for our national unpreparedness in 1941 is a view most well-informed persons will support. In retrospect, it now appears that we were just plain lucky at Pearl Harbor. Even if the fleet had been at sea, there were not enough airplanes to meet the attack. The grim luck was that the fleet was sunk in shallow water from which the ships could be raised and repaired. What if the fleet had been sunk in water a mile deep?

This department has been lambasted repeatedly for stupidity, reactionaryism, Bourbonism, diehardism, Toryism. It is likely that more of such epithets will be directed this way for the foregoing paragraph. Any who are of this intention are invited to reread pages 307 to 318 of June, 1939, FOOD INDUSTRIES. This special section, entitled "Food and National Defense," was published because it had long been plain that war was imminent. Hostilities began two months later. Did anybody pay any attention to this defense study so laboriously prepared by three months of effort? None that we can recall.

### A Case in Point

In 1941, one of the editors of FOOD INDUSTRIES called on the head of one of the largest food companies to learn his views regarding the effect of the war on the food processing industry's markets. The said president nearly had an apoplectic fit and all but invited the editor to leave the office. Was this because the president was stupid? Positively not. He was influenced by the existing popular attitude of the American people. War, preparedness, Selective Service, military needs, and so forth, were very unpopular subjects, and anyone who would even utter a word in favor of them was attacked as a war-monger. Yet six or seven nations declared war on us only a few months later.

Unhappily, however, American public opinion did not "snap out of it" on December 7, 1941. We still have the same characteristic that we had in 1941—the characteristic that resulted in unpreparedness, in the fleet's being in Pearl Harbor when the Japs struck, in the consternation at being attacked without a declaration of war. It is difficult to define this characteristic, but its symptoms are very plain. In military parlance, the symptom is poor liaison. It has even been observed in two different theaters of war long after Pearl Harbor. Its worst wartime examples about which this publication has first-hand knowledge occurred in the SWPA: (1) Subsistence procurement officers received repeated complaints from combat units about food quality (gripes about monotony), yet every request to visit the islands to investigate the merits of the complaints was disapproved by higher-ups; (2) the "S.S. Moormacdove" lay at anchor in Milne Bay, New Guinea, for a week in August, 1944, awaiting orders from shore authorities. One ship-week was wasted at a time when ships were in urgent demand, all because of poor liaison.

### Ignorance of World Facts

Inadequate liaison between Washington and Pearl Harbor was one fundamental error of the Pearl Harbor period. But it is not the reason our fleet was sunk. The real reason is that we were hardly better prepared to defend it from torpedo-plane attacks than the British "Repulse" and "Prince of Wales"—both sunk in deep water. Underlying our tactical errors is the poor liaison of the bulk of the people of the United States with the significant events and facts of the world. Most of us didn't know and refused to learn.

If the American people continue to be more interested in the sporting pages than in overseas news, more interested in Social Security than in world economic conditions, more interested in excitement and entertainment than in profitable use of leisure, more interested in "what's in it for me" than in an occasional altruistic deed, then we can expect to see an inadequately informed body politic and more Pearl Harbors.

The only escape from further surprises of an unpleasant sort will come when all nations are democracies and all governments are subservient to the wills of their respective peoples. In a totally democratic world, people can be poorly informed and yet be reasonably safe in a military sense. But given the existence of one powerful nation subject to the rule of a small group—a dictatorship—then no democratic nation can ever dare to enjoy the contentments of provincialism and complacency.

President Truman was right. We were all to blame for Pearl Harbor.

L. V. Burton EDITOR

# The Talk of the Industry

蒸熟米

• FROM a Chinese caller at our offices we learn that the process of enrichment of rice from the vitamins in the rice husk is old stuff to Chinese farmers. They do not realize that they are transferring vitamins, but they do know that the product which they call "Tsing su mi" or "Zen su mi" is beneficial to health. Our visitor also provided the accompanying Chinese characters. Our point in bringing it up here is to show the needlessness of a military security regulation that has prohibited divulging an American process to accomplish the same thing.

Speaking of things Chinese, one of their physicians once laughed heartily about all the furore about penicillin, saying that it had been utilized for centuries in China. When they apply a bread-and-milk poultice to the human body, they never change it but allow it to remain until it is thoroughly moldy, thereby generating penicillin on the spot.

Clever people, these Chinese.

• SPEAKING of secrecy: Last spring a friend wrote that the biggest boondoggling job in American history was going on where he was employed. He urged that people should demand an investigation that would put a stop to this waste of taxpayers' money, for thousands of people were very busy accomplishing exactly nothing. The plant, it now develops, was the U-235 plant at Oak Ridge, Tenn.

• As long as the government pays a subsidy, for the production of milk it is profitable for farmers to retain many scrub animals in their dairy herds that otherwise would have gone to slaughter long ago. The easiest way to increase the meat supply of the United States would be to reduce or eliminate the subsidy.

At the present time the number of beef animals of all sorts on farms and ranges is considered to be larger than would be good for the country, were the world food demand to revert to its prewar status.

### Why Your Issue Is Late

**Your October issue of FOOD INDUSTRIES has arrived late because of a city-wide typographical strike in Chicago. We regret this delay over which we have no control.**

**Unfortunately, the accumulation of work in the shop may also cause your November and December issues to be late.**

• POULTRY BREEDERS are reported to be toying with a plan to breed an all-white-meat strain of chickens. Which to our way of thinking is unfortunate. Any lover of dark meat has had plenty of disappointing experiences when serving his guests. He fondly hopes that a few will call for white meat, but when he finally serves himself there are only a few pieces of dry white meat left.

Our opinion is that a tender all-dark meat chicken would command a premium price over all-white-meat poultry.

• Now that the fighting is over, we should like to know the answers to these questions:

1. Who was the person who had the most to do with lumping together—under red-point rationing—these food products: butter, lard, margarine, meat, cheese, evaporated milk, fish?

2. Who was the genius who decided that a processed food is the hodge-podge that OPA defines it to be?

3. What became of the much-touted Industrial Mobilization Plan that was suppressed along about Jap Sunday?

# Hors d'Oeuvres

• In 1943, accidents killed more than 17,000 farm people and injured 1,500,000. Apparently producing food is not the quiet, uneventful life it is cracked up to be.

• *With war's end and restrictions easing, black markets face a black future.*

• Pepsi-Cola has a new 64-ft., diesel-powered, river cargo boat to augment deliveries on the New York waterfront. Called "Big Bottle," the boat will carry 6,000 cases of the 12-oz. refresher and will fly a barrage balloon. The function of the latter equipment probably is to get a barrage of publicity.

• *Japan's Institute of Physical and Chemical Research—where 118 buildings once were required to house the work of Nip technologists—wound up the war making sake from dried sweet potatoes. During the past two years, the Japs certainly set an all-time record for progress—in reverse.*

• In tests at Cornell University, cows produced by artificial breeding are outstripping their dams in the production of milk and butter fat. A dam shame, from the bull's viewpoint.

• *Experiments are underway with a paint containing DDT, its purpose being to get rid of flies and mosquitoes. And a new concrete known as Hubbellite chases roaches away and also is a deterrent to molds and bacteria. Utopia, here we come.*

• Russia is using a fertility serum on sheep, and 150 to 180 lambs are born where only 100 to 120 were born before. The serum is a pituitary hormone injected under the skin to give nature a hot-foot.

• *It is believed in the butter industry that Florida's proposed legislation to impose a 10-cent tax on artificially colored butter produced outside the state for sale in the state would be unconstitutional. Probably. And margarine manufacturers must be amused that the shoe is on the other foot.*

• One authority finds that "when the capacities of the disabled veteran are properly matched with the job, the disability ceases to be a handicap." Paste that one in your hat.

• *In the preparation of garlic extract, darkening to deep amber color and development of oxidized stale odor and flavor occur. But how can anyone tell when garlic is off-odor?*

• Cultivated in India, sugar cane was carried to China, probably in 800 B. C., then it spread to Persia, Arabia, Egypt and northern Africa. It was not cultivated in Europe until 700 A. D. Progress in food did not move at too dizzy a pace in those times.

F. K. L.

"In some fields the salary ceiling is low."

# Salaries for Food Technologists

**Technical brains are sold dirt cheap in the food industries. At least that is the pointed contention of this writer. What's more, he says, the employment questionnaires are cockeyed. Here, indeed, is a ringing challenge**

By POOR RICHARD

WHEN Donald M. Nelson, recent head of WPB, and previously an upper-bracket executive for Sears, Roebuck & Co., was asked why he had abandoned chemistry as a career after a promising start, his blunt answer was: "In some fields the salary ceiling is low."

Mr. Nelson, if this writer recalls correctly, was well on the way to becoming a textile chemist when he began to wonder whether his future financial rewards for technological skill were likely to keep pace with his certain-to-be acquired tastes for the finer—and more expensive—things in life.

From the experience of many food technologists, the Nelsonian dictum has been amply justified. It can even be said that particularly in the food industries are technical brains sold dirt cheap, that in no other field does the employer get so much for so little.

A study of the Situations Open columns of industry journals is an instructive, and heartbreaking, preview of what the technical man can expect in the way of compensation for services rendered.

Most of the advertisements are quite explicit on the qualifications of the man they want, though vague in the extreme concerning what salary they intend to pay for the technical skill, knowledge and experience they seek.

### Help Wanted

Look at some recent advertisements:

"Creative research expert — real opportunity with outstanding national manufacturer to head up comprehensive laboratory research program. Wanted attributes: ability to create items and ideas, adeptness at food artistry, food technology experience, previous successful record."

"Position requires originality and ideas. Wide experience, knowledge of technique of making all types of candy and aptitude for development work are essential qualifications."

"Food chemist possessing experience, imagination and initiative, to assume full responsibility for quality control and research, and new products and laboratory."

"Take charge of quality control, some research. Knowledge of freezing and dehydration essential. Must know legal aspects of preserving and fruit butter industry."

There are food technologists, and good ones, who have all those qualifications and that do take those jobs. And with those qualifications, can anyone doubt that their presence in a company or in a business organization will help that company to grow and prosper? Of course they'll help—and, many times, their efforts mean the difference between red or blue ink on the company's books at the end of the year.

So then, by that token, it might be expected that the salaries offered for the possession of "experience, initiative, and imagination," and "assuming full responsibility for quality control and research, new products and laboratory," and all the rest, would be something pretty good. It ought to be something in the way of a salary that

### A Hot Subject

**Because of the extremely controversial nature of this article, we submitted it to ten employers and ten employees for criticism. The reaction was like tossing the proverbial match into high-test gasoline. Both groups were divided 50-50 as to the fairness of the complaint; as to the desirability of its publication. Some urged immediate publication, saying it was high time the subject was ventilated. Others averred that the author must have had a very limited experience, that technical men could earn as high as $50,000 in some food companies.**

**This article came to us unsolicited. A lively debate is expected. Your identity will be withheld from your comments, if you desire. But we cannot accept anonymous contributions.—THE EDITORS.**

you could comfortably send the kids to college on, and maybe even afford to join the Country Club for yourself and the Missus.

### The Sad Truth

Well, it won't be. No matter if the ad is phrased in such terms that only a C. F. Kettering could measure up to it, the sad truth is that if salary is not mentioned—and 99 times out of 100 it isn't—the ad means less than $5,000 a year. Usually it means considerably less than $5,000.

True, the ads put in a come-on touch, as for example skirting around the salary angle with: "Future depends entirely on your ability to grow," or "Excellent opportunity," or the frequently used "Compensation commensurate with ability" line that is rapidly becoming standard equipment for ads. One advertiser even went so far as to state, no doubt in a burst of generosity which was regretted later, that he was "willing to pay chemist what he is worth." There's a man who carries willingness to great extremes!

But no matter what is said, the phrase actually means nothing except the intention to buy technical skill at as low a rate as the technical man will sell it. And technical men, in this writer's opinion, are: (1) babes o' the woods in the rough and tumble of selling; and (2) don't have the foggiest notion of the commercial worth of the skills they want to sell.

This, of course, is a matter for the technical man to correct. It is also something about which the various professional societies which technical men support ought to do far more about than they are doing at present. It is useless for a professional society to exist largely for the purpose of advancing and extending a body of knowledge when the welfare of the members of the society demands quite a different sort of program. The upbuilding of the body of knowledge is a very fine and noble thing, but by its very nature the benefits of such a program largely accrue to industry and society in general. By the time these benefits trickle down to the level of the technical man, they are extremely diluted, so to speak.

### Cockeyed Questionnaires

One of the other things wrong with the setup is the questionnaire used by most of the personnel departments of the companies employing food technologists. Rarely is the questionnaire specifically designed for the purpose of finding out about technical skills; most often it is aimed at routine, unskilled, low-bracket help, and the whole thing is in the nature of an intellectual insult for any technical man worth his salt. But the questionnaire itself does constitute one more warning sign to the chemist who will look at what it truly represents, and that is: "Abandon all hope of high salaries, ye who enter here!"

For when we find management treating technical men like clerks, or unskilled day laborers, in the questions asked of each, then there is very little likelihood that management will treat one with greater respect than the other. In fact, in these days of well-organized unions, it is better than an even money proposition that the laborer will get both the respect and the high wages.

### Respect vs. Pay

Respect and money go together. It may be entirely a human failing, but this writer has yet to meet the business man who does not undervalue that for which he has underpaid.

It will be interesting to take a look at some of the questionnaires. ----- -------- ------, Inc., advertising for a chemist and food technologist to take complete charge of its quality control and development laboratory in a plant manufacturing a wide variety of food products, sends a questionnaire listing about 50 questions, not one of which has any direct connection with the ability to head up a laboratory. Among the questions, however, are these: "Are you willing to work any shift?" "Are you single, married, widowed, divorced or separated?" "Give number of children, ages of children and number of other dependents." "Give present employment of parents, wife or husband, and children." "Give rate of pay by the hour and by the week in your last five jobs." Now where is the sense of that sort of thing? Or doesn't the personnel office know the difference between a scrub woman and a chemist? Personally, if this writer were the scrub woman, he would still think it none of that company's affair where my parents, wife or husband, and children were working.

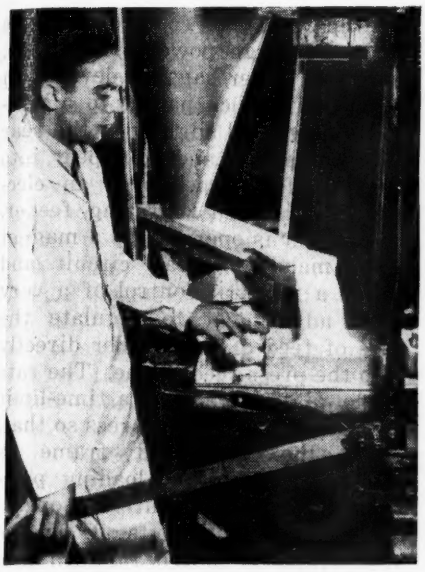
Questionnaires used in hiring technologists are too long, and ask too many silly questions.

### More of the Same

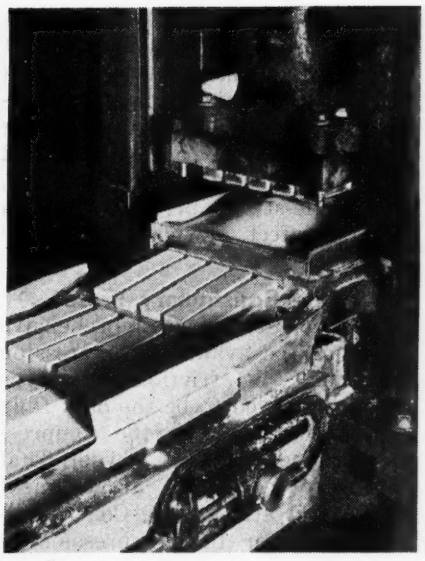
But lest the reader think this is an unusual case, let us look at the sort of thing the ------ ------- --------- Co. wants a prospective chemist to fill out for it. It has all the questions of the company previously mentioned, plus a few extra. The extra ones include such honeys as: "Are you right or left handed?" Now what possible difference can that make? (By the way, of the top ten American chemists, can you name those who are left handed and those who are right handed? Do you suppose anyone really cares?) This second company is also interested in this question: "Have you a preference for any particular work or department?" After all, they've been advertising for a chocolate chemist, and you're the chemist who has answered the ad. But still they want to know whether you've a preference for any particular work!

The ----- --- ------- Co., wishing to employ a chemist for supervision of the production of gum base material, sends a questionnaire form far more detailed than either of the others. This questionnaire is four pages long, and on the first page in this underlined, bold-type warning: **"Every question must be answered."** On page two is the underlined, bold-type warning: **"To avoid delay answer all questions."** On page three is still another underlined warning: "The accuracy, legibility, and completeness of this application will be taken as evidence of the applicant's intelligence and the importance

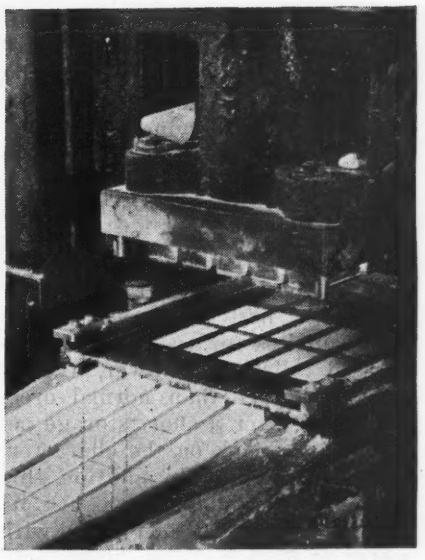
(*Turn to page* 186)



The tile type of press is loaded by means of a press-feed frame which is manually shifted from beneath the feeder spout to above the die frame of the press. The feeder operates only when the feed-frame is in filling position.



As the feed-frame is pushed into press-loading position, the previously compressed units are pushed onto a polished-surface incline and the lower plungers of the press retract to permit filling of the die-frame by the free-flowing powder.



Withdrawal of the feed-frame to the refill position releases the electrical safety stop on the press and permits the multiple compressor dies to decend into the powder-filled pockets to form a block or disk approximately 5/8 in. thick.

# Compression Helps To Solve Army-Ration Problems

**Compression has put more food, higher nutritive value and greater variety into combat rations, without serious additional demands upon packaging and transportation facilities. Its peacetime possibilities warrant study**

By LIEUT. R. R. MICKUS and LIEUT. W. H. WHITE,
Quartermaster Subsistence Research and Development Laboratory, Chicago, Ill.

WHEN it began to investigate compression as an aid in developing combat rations, the Quartermaster Corps had three objectives in mind. They were (1) to reduce bulk by getting the same quality of food into less space, (2) to increase the quantity of food in a given space, and (3) to make possible an increase in variety of food in a given space.

These objectives were met by shaping the compressed ration item to permit complete utilization of the available space in the ration container, as well as by reducing the volume of the space occupied by an individual ration component. To that end, the compressed products were made circular if the ration was to be packed in cans, as is the case with the C Ration; rectangular if to be packed in a box, as is the case with the K Ration.

The first ration items considered for compression were premixed cereal, sugar, and cocoa beverage powder because they seemed most suitable. Of the problems encountered in compression, those met and solved in connection with cocoa beverage powder are representative.

Cocoa beverage powder is a mixture of cocoa powder, nonfat milk solids and sugar, requiring only the addition of water preparatory to its consumption. Because of the conditions under which this mixture may have to be used, it must disperse readily in water at as low as 60 deg. F. For that reason, it has to be compressed and wrapped in a manner that permits easy return to the powdered state while in its wrapper, and it must be shaped into a disk that fits into the ration container.

Preliminary study of this beverage-powder compression problem brought out these facts: (1) Powder made by some companies was more adapted to compression than was others. (2) The application of pressure to the powder had to be closely controlled. (3) The type of powder used and the control over the application of pressure influenced solubility, tendency to "set-up" or harden and the property of the compressed disk which permits it to be crumbled and returned to a free flowing powder. (4) Binding agents cannot be used.

This study also revealed that each manufacturer of cocoa beverage powder had a powder of in-

dividual characteristics of solubility, texture and cohesiveness or resistance to being returned to the powder state. These differences resulted from the varying methods of manufacture, variations in ingredients and formula deviations.

One of the powders tested became so hard, even under slight pressures, that it could easily pass the hardness test of a floor tile. Another powder at first appeared to have the requisites for a successful compressed disk. However, under slightly higher than normal pressures and after a short storage period, it also took on the characteristics of floor tile. In addition, this powder, after compression, lost its wetting property. When mixed with water at 60 deg. F., it "flaked off" and settled to form a sludge on the bottom of the vessel.

Fortunately, a powder was found which had the desired combination of properties. Although this particular powder is considerably more difficult to compress, it does readily return to powder under slight pressure. It also retains satisfactory wetability and quickly disperses in water at 60 deg. F. with little sludge formation on the bottom of the cup or glass.

During the study, several types of cocoa beverage powders were compressed on presses of varying design and construction. At once, the single-stroke press operating on an eccentric was ruled out as impracticable. Its pressures could not be satisfactorily controlled, and it formed a disk of too great a density. The mixture had a tendency to set-up or harden during storage and could not be returned to a powdered state. In addition, the single-stroke pressure had an adverse effect upon the solubility of the powder.

### One Satisfactory Press

In the course of a comprehensive study of the available compression equipment, the friction-screw type of press proved to be the only fully satisfactory one for the compression of cocoa beverage powder. That discovery led to an arrangement with the National Tile Co., Anderson, Ind., for the compression of cocoa beverage powder for the C Ration.

The friction-screw type press is motor driven with a V-belt hookup to a pair of disk-shaped flywheels which actuate the screw press by means of a horizontal cam operating tangentially in contact with the vertical surfaces of the flywheels. Its principal shape-forming parts are a stationary, multiple-pocket die frame, a lower multiple plunger and one upper multiple compressor die. The upper plunger, operating on the screw-press principle, is the functional portion of the rotating cam portion of the compression unit. It is thrown into and out of engagement by a manually operated clutch.

**Development of the semiautomatic wrapping and sealing machine has simplified the production of compressed foods by largely eliminating manual labor, reducing the floor space required and making possible full inspection at time of packing.**

Preparatory to compression, the cocoa beverage powder, in 100-lb. multiwall paper bags, is elevated on wooden lift-truck pallets to a platform above and slightly to the rear of the press and dumped into 10½-cu. ft. hopper over an electrically operated vibrating feeder. The feeder is operated by a magnet in a make-and-break circuit and under a rheostat control of a very wide adjustment to regulate the rate of feed of the powder directly into the press-feed frame. The rate of flow is governed by a time-limit switch attached to the press so that, when the press-feed frame is brought back to the loading position, the feeder is put into operation. The feeder cuts-off as the feed frame is moved forward into position over the multiple-pocket frame with the upper plunger in a raised position.

When the feed frame is in position for loading the press, the lower plunger is in a retracted position about 1½ to 2 in. below the top of the multiple-pocket frame. (The position of the plunger depends upon the depth of the press pocket necessary to hold the required weight of powder.) In this position, the multiple-pocket frame serves as a receiving form for a predetermined weight of the powder loosely packed above the face of the lower plunger. Immediately upon withdrawal of the "press-feed frame" to a refill position, an automatic release permits a clutch engagement with the motor which causes the upper plunger to drop onto the loosely packed powder, the multiple-pocket frame becomes the walls of 16 disk molds, and the powder is compressed into disks ⅝ in. thick.

By a manually operated lever, clutch release and engagement causes the rotating cam head to move up and down on the faces of the disk-shaped flywheels. This permits the plunger to be dropped on the powder as many times as are necessary to compress the disk to the desired thickness or until it has the predetermined hardness to withstand essential handling during wrapping, packing and shipping.

When these conditions have been attained, the lower plunger is raised and the compressed disks are pushed from the multiple-pocket frame under steady pressure to keep breakage or chipping to the minimum. During this ejecting operation, the lower plunger for each pocket in the mold frame is raised until its face is level with the top

of the multiple-pocket frame to give a smooth surface. From this smooth surface, the disks are pushed onto a polished-surface incline by the press operator as he returns the press-feed frame to its press-loading position. The lower multiple plunger drops to its retracted position as the feed frame reaches its press-loading position.

Since the press is the controlling unit in the compressed foods production setup, particular care must be taken that it functions properly. Proper lubrication of its moving parts is an essential; over-lubrication is more of a virtue than a sin. Also, the surfaces of the dies must be kept highly polished to prevent sticking of the powder and mutilation of the disks. Use of Aluminite "A" as a polishing agent has proven highly successful and is greatly preferred over the use of scrapers or other mechanical means for removing any film or particles of the mix adhering to the die surfaces.

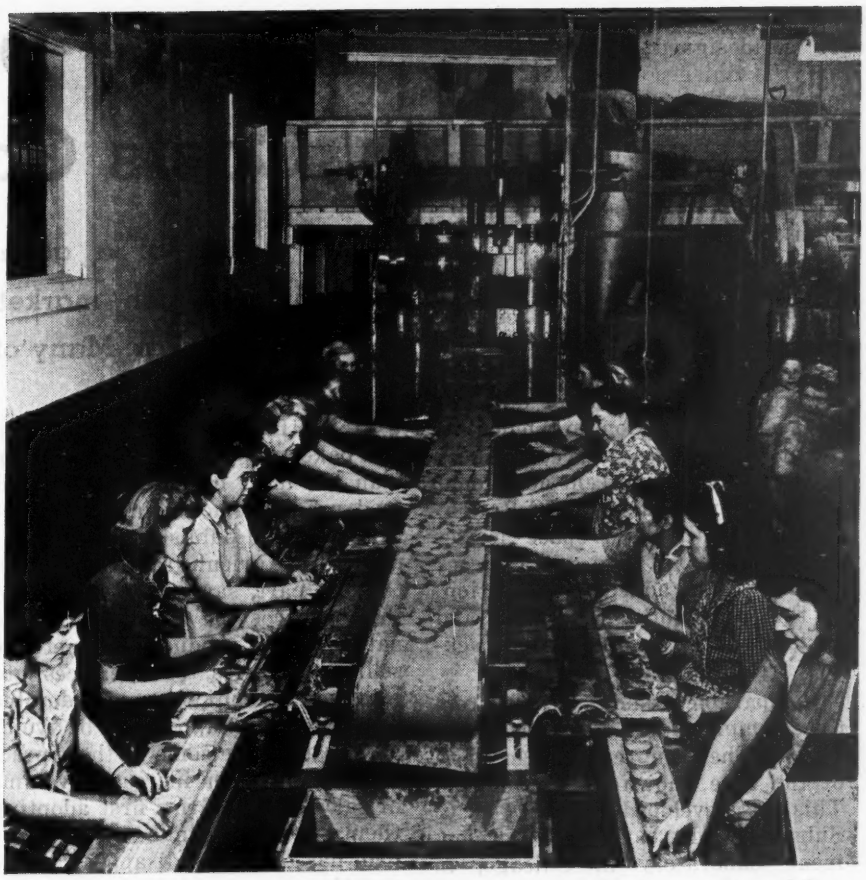
### Packaging Operations

As the disks are pushed down the polished-surface incline, they move onto a 12-in. endless-belt conveyor for transfer to the wrapping and sealing stations. This conveyor is mounted 6 in. above the wrapping-table level so that the disks may be delivered within easy reach of the wrapping operators, to be removed as wanted.

Essentially, the wrapping is a manual operation and performed on a table 15 ft. long, 4 ft. 6 in. wide and 3 ft. high, equipped with two wrapping and heat-sealing stations on each side of the delivery conveyor.

Each disk is loosely wrapped by a 6-in. square cellophane sheet applied with the aid of a light-weight, splinter-free, split-resisting movable board, 5 in. wide and 2 ft. long, containing four holes with a diameter equal to the diameter of the finished disk, including its cellophane wrapper.

In practice, the wrapping and sealing operations require a team of three operators for each heat-sealing unit. Two operators slide cellophane squares over the holes in the board, place a disk on each wrapper, force both wrappers and disks into the holes of the board to obtain a snug bottom and edge contact between disks and wrappers, and shove the filled board to the sealing-jig operator. This third operator pushes the filled board forward to a position beneath a heat-sealing jig to make half of a top-seal on the disk in approximately 30 seconds. The board is then shifted from this sealer to a second heat-sealing jig to complete the wrap and top-seal the disk. As each succeeding board is shifted from the first to the second heat-sealing jig, it simultaneously pushes the preceding board from beneath the second sealer to a position immediately in front of the sealer operator.



**Compressing and packaging line. The mix is emptied from bags into a hopper (background) over an electrically operated shaker-feeder. The hopper is equipped with an electric vibrator to assure uniform discharge into feeder.**

From this position over counterpart slots in the table, the operator pushes the finished disks out of the holes in the board into a metal chute leading to a lower narrow endless-belt conveyor for transfer to the packing table. The empty board is then moved by the sealing-jig operator to a position in front of the other two operators who repeat the preliminary wrapping and board-filling operations. As these four teams of three operators for each compression line develop a rhythmic coordination, the wrapping and sealing operations become geared to a high rate of production.

The sealing jigs consist of brass plates approximately ¼ in. thick, 5 in. wide and 2 ft. long and are heated with a Chromalox bar-type heating element. The brass plates are cut out and beveled to make the cellophane wrapper conform to the disks when the filled board is pushed under the heat-sealing jig. For ease of cleaning, the jigs are installed so that they can be quickly removed and freed from any of the powder which may adhere to the heating surface.

As the production of these cocoa beverage powder disks has progressed, a semiautomatic wrapping and sealing machine has been developed. It requires only the placing of the cellophane and disks into pallets with openings of the proper size to permit insertion. The pallets are component parts of a roller chain conveyor between the press and the packing station. Only three operators are required to position the cellophane sheets and the disks from a 16-pocket press operating at the rate of 100 disks per minute. As the pallets pass under a cellophane top-folding and heating unit, the disks are automatically sealed as effectively as by the manual method. Just before the pallets reach the discharge apron to the packing table, the disks are automatically forced out of the pallet pockets.

The inspection and packing tables

for these semiautomatic machines are so designed and constructed that the finished disks can be inspected and packed directly into corrugated paperboard containers as they slide down the apron from the wrapping machines. To keep breakage of the disks to a minimum during handling, the corrugated containers are fitted with corrugated separators, tight sealed and shipped directly to a central assembly point for inclusion in the C Ration.

Through the solution of development and production problems incident to compressing cocoa beverage powder, 33 percent additional powder is included in the C Ration, and sufficiently less space is required to permit two extra pieces of candy to be added to the ration. In this way, both the amount and variety of food in a C Ration package are increased.

Comparable benefits result from the compression of cereal and sugar. The compressible cereal is of the type known as "premixed." This was developed by the Q. M. C. Subsistence Research and Development Laboratory in Chicago, in collaboration with the cereal processors. It is a mixture of ready-to-eat cereals, sugar, dried skim milk, shortening and salt, and it can be eaten either in the compressed state or can be crumbled into a canteen cup with the addition of either hot or cold water. Upon the addition of water, the milk in the mix reconstitutes to give a resulting product quite similar to the ordinary civilian ready-to-eat breakfast cereal.

Before it had been compressed, the cereal item could not be included in the combat rations because of its bulk. By reducing the space requirements 50 percent through compression, its inclusion in the C Ration became practicable. Subsequently, cereal bars have been included in the K Ration, a 1½-oz. bar replacing three not-too-popular biscuits.

Granulated sugar was originally included in the C Ration, but it was insufficient in quantity to sweeten fruit beverages adequately. By compressing the sugar into a disk to replace the rectangular package then used, 50 percent more sugar is being put in less space, and the remaining available space is filled with additional candy. For the K ration, compression makes possible the addition of 50 percent more sugar without any appreciable increase in space requirements.

# Bakery Distribution Costs Come High

**This outline of a government report reveals the extent to which marketing expenses cut into the consumer dollar. Many of them are judged avoidable**

DISTRIBUTION COSTS for bakery products are higher than for most other manufactured food products, according to a survey made and published by the Bureau of Agricultural Economics. Only in part, says the Bureau, can this high cost be attributed to the nature of the product. Competitive selling practices, or "services" to retailers, account for a considerable amount of what appears to be avoidable cost. While some of these practices resulted in increased volume of sales for the firms first adopting them, the advantage to any one firm has tended to disappear as the practices were adopted generally. They have now become simply added costs saddled upon all competitors.

In the biscuit, cracker and pretzel segment of the industry, one of the most uneconomic prewar practices was that of having salesmen call upon retailers twice a week and the making of deliveries two or more times a week, when once a week for each would have been ample. Inquiry among retailers disclosed that most of them did not want this extra service. Individual manufacturers, however, were afraid to reduce the number of deliveries for fear of losing their competitive position. Since distribution expenses amounted to 35 percent of net sales for biscuit, cracker and pretzel companies, in 1939, it would appear that cutting salesmen's calls and deliveries in half should result in savings of sizable proportions.

Packaging costs also appear to be high in this portion of the industry, according to the report. Containers and material costs, not counting labor and machine packing costs, ranged from 85 cents to $3.24 per 100 lb. of product, in 1942, and accounted for from 8 to 22 percent of total costs and expenses. The survey concedes that it is difficult to determine the minimum packaging costs necessary to retain the maximum freshness of the product.

**TABLE I—Cost Per Dollar of Net Sales to Produce and Sell Bread and Rolls by Bakeries, in March and September, 1942.**

| | March, 1942 | | | September, 1942 | | |
|---|---|---|---|---|---|---|
| | 337 wholesale bakers | 28 house-to-house bakers | 18 chain store bakers | 337 wholesale bakers | 28 house-to-house bakers | 18 chain store bakers |
| | Dollars | Dollars | Dollars | Dollars | Dollars | Dollars |
| Total net sales | 25,863,899 | 2,340,290 | 2,310,154 | 29,959,286 | 2,432,858 | 2,337,662 |
| | Cents per dollar of net sales | | | | | |
| Cost to produce and wrap | | | | | | |
| Materials | 40.36 | 33.97 | 47.95 | 40.75 | 35.00 | 49.45 |
| Direct production labor | 10.42 | 8.70 | 8.27 | 11.25 | 9.18 | 9.31 |
| Indirect labor and overhead | 8.85 | 8.53 | 10.14 | 8.15 | 8.02 | 10.13 |
| Wrapping material | 6.27 | 4.20 | 6.92 | 6.05 | 4.27 | 6.91 |
| Total cost to produce and wrap | 65.90 | 55.40 | 73.28 | 66.20 | 56.47 | 75.80 |
| Gross margin from sales | 34.10 | 44.60 | 26.72 | 33.80 | 43.53 | 24.20 |
| Selling and delivery expense | | | | | | |
| Routemen and supervisors' compensation | 12.11 | 22.23 | .13 | 11.85 | 22.40 | .15 |
| Delivery and vehicle expense | 4.79 | 9.06 | 8.70 | 3.84 | 7.86 | 9.28 |
| Other selling expense | 6.66 | 6.04 | 3.12 | 6.72 | 5.40 | 3.59 |
| Total selling and delivery expense | 23.56 | 37.33 | 11.95 | 22.41 | 35.66 | 13.02 |
| Administrative and general expense | 5.34 | 4.61 | 6.42 | 5.18 | 4.30 | 6.56 |
| Total selling, administrative and general expense | 28.90 | 41.94 | 18.37 | 27.59 | 39.96 | 19.58 |
| Net profit per dollar of sales | 5.20 | 2.66 | 8.35 | 6.21 | 3.57 | 4.62 |

[1]Federal Trade Commission report on Distribution Methods and Costs, Part I—Important Food Products, 1944, p. 45.

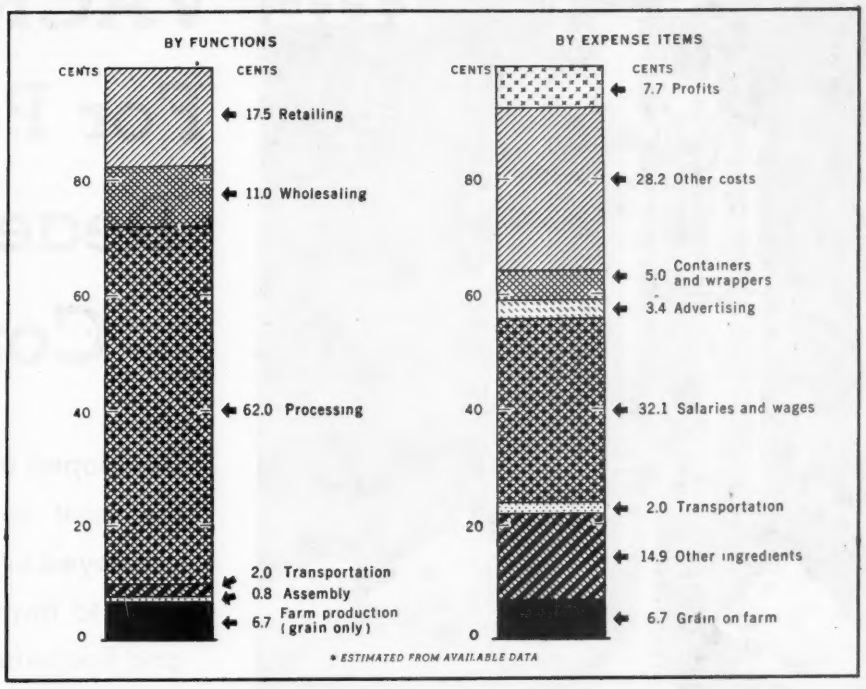
Where such costs are incurred, however, they would certainly seem to warrant a reduction in the number of deliveries, if the package is effective in retaining the freshness of the product.

Excessive deliveries have been, perhaps, an even greater problem among the bakers of bread and kindred products (rolls, pies, soft cookies, etc.). Prior to ODT orders for truck-mileage conservation, two to four deliveries a day were not uncommon, when one delivery a day would have been sufficient. It is estimated that once-a-day delivery requires only about 63 percent of the mileage required of twice-daily deliveries. From March to September, 1942, wholesale bakers achieved a saving of 15 percent in delivery-vehicle expense through reduced deliveries.

When drivers are paid on a commission basis, bakers may not be so keenly aware of the added costs of extra deliveries as they are when the driver is paid on a salary basis. But even on a commission basis, the once-a-day-delivery driver can be paid a smaller commission per loaf and still earn as much or more on the larger volume.

The Bureau finds the acceptance of stale bread returns to be one of the most wasteful practices in the whole baking industry. It is closely associated with the practice of overstocking on the assumption that a large display helps to sell the product. The loss from stale bread returns is given by a Federal Trade Commission study as ranging from less than 1 to nearly 3 percent of total production. These percentages, however, are said by the Bureau to be very low because they do not allow for the selling and delivery expense on the bread, nor for the cost of collecting and accounting for the stales. Individual bakeries, reporting in the survey, had as high as 33 percent of total deliveries returned as stale bread. Hope is expressed that some way may be found to continue into peacetime the wartime prohibition against return of stales.

Distribution expenses could be lowered considerably, declares the report, by selling a 2-lb. instead of a 1-lb. loaf. While a 2-lb. loaf may be too large for some families, there are still large numbers of families that could consume such a loaf without danger of staleness. The only additional costs in producing and selling the larger loaf are the added raw materials and baking time plus the additional space required in the truck. Most other costs would be the same. A 2-lb. loaf, priced so as to pass most of the saving on to the consumer, could easily result in an increased total consumption of bread, particularly because the large families, that would naturally use such a loaf, are often low-income families.




**The estimated breakdown of the consumer's dollar paid for bakery products in 1939 shows the high marketing and processing margins required by the industry. Of the 62 cents shown for processing, 58.8 cents is accounted for by the baking, including the cost of ingredients other than flour, and 3.2 cents for flour milling. (Prepared by BAE.)**

While emphasis is placed on the possibilities of reducing costs through more efficient selling and distribution methods, the report does not overlook the baking industry's very high marketing margin. This margin, for all bakery products, averaged about 82 percent of the retail sales during the 18 year period, 1927 to 1944.

## A Recent Study

The most recent study of the costs of production and distribution of bread was conducted by the Federal Trade Commission for the operating periods of March and September, 1942. The inquiry covered 377 wholesale bakeries, 28 house-to-house bakeries and 18 chain-store bakeries.

Total selling and delivery expenses, per dollar of net sales, in the March period amounted to 37.33 cents for house-to-house bakers, compared with 23.56 for wholesale bakers and 11.95 cents for chain-store bakers. The net profit was highest for the chain-store bakers in March, 1942, amounting to 8.35 cents. Wholesale bakers led the profit column in September, 1942, however, realizing 6.21 cents.

A similar study made of 16 firms in the biscuit group in 1939 showed that three large companies, who sold their product to all classes of customers, had net sales of nearly $142,000,000, while 13 companies, selling to retailers and wholesalers, had net sales of nearly $10,000,000. The three large companies had a total distribution expense of 35.28 cents per sales dollar, compared with 25.75 cents for the smaller companies. This difference is accounted for largely by the greater expense of salesmen's salaries (6.87 cents compared with 2.48), greater "other distribution personnel salaries and wages" (8.90 and 6.59), greater advertising and promotional expense (4.47 and 3.49), outward transportation (7.11 and 5.83), and other distribution costs (6.29 and 4.63). These costs were higher for the large companies because they distributed a greater proportion of their products direct to retailers. Salesmen's commissions and bonuses, on the other hand, were lower for the three large companies, amounting to 0.65 cent as compared with 1.36 for the 13 smaller bakers. Likewise, commissions to selling agents were lower, 0.06 cent against 0.93. The cost of merchandise sold came to 53.23 cents per dollar of net sales for the large companies and to 73.75 cents for the smaller firms.

# THE VACREATOR— For Pasteurizing, Deaerating and Condensing

**Developed in New Zealand, this is one of the most versatile pieces of equipment employed in dairy processing. It has been used to improve the quality of cheddar and Roquefort-type cheeses and of butter and ice cream. It has other possibilities**

**The "Baby" model Vacreator, which has a pasteurizing capacity of 2,500 lb. of cream an hour. Two larger models are made.**

By G. H. WILSTER, Professor of Dairy Manufacturing, Oregon State College, Corvallis, Ore.

THE Vacreator is one of the most versatile items of equipment employed in dairy processing. It is used to pasteurize cream for butter, to pasteurize milk for cheese, to condense milk for ice cream mix, to pasteurize ice cream mix, and to process pure butter oil. And new applications are being found.

The inventor, H. Lamont Murray, operated a condensed-milk factory in the North Island of New Zealand when he conceived the idea of vacuum-pasteurizing cream to be used in butter manufacture. He knew from experience that the boiling of milk, under reduced pressure, tended to deaerate the milk and remove feed and weed flavors. And he reasoned that the same results might be obtained with cream. In 1923, Murray became part owner of the Te Aroha Dairy Factory in New Zealand. It was in this butter factory that vacreation as known today was evolved.

This method of pasteurization and cream treatment soon became popular in New Zealand, where approximately 400,000,000 lb. of fine-quality butter is made annually. Before the war, about 80 percent of New Zealand's butter was made from vacreated cream.

In the process of vacreation the product is first flash heated to pasteurization temperature (160 to 200 deg. F.) under reduced pressure. Then it is subject to steam distillation and the removal of water vapor, oxygen and volatile substances under further reduced pressure. In the final stage it is exposed to a nearly complete vacuum and the temperature is reduced to about 110 deg. F.

Figure 1 shows the flow cycle. The product, fed by the pump *X*, is admitted by a float control valve to a perforated spray pan, located in the top of chamber *A*. It falls in droplets from the spray pan and is heated by contact with steam admitted through valve *B*. The pressure in the pasteurizing section is below atmospheric and may be held at any desired point, usually between 20 in. and 6 in. of vacuum, thus maintaining any temperature from 160 to 200 deg. F. A spring-actuated equilibrium ball valve *C* is located between the pasteurizing chamber and the next section of the machine. The second chamber *E* and the pipe *D* are kept at a reduced pressure of about 20 to 25 in. of mercury by the action of the ejector condenser *F*. The relative pressures in *A* and *E* are controlled by the adjustment of the tension on the equilibrium valve *C*.

The mixture of steam and product, reaching the bottom of the pasteurizing chamber *A*, is drawn past the equilibrium valve, passes up the pipe *D* and is discharged tangentially into the cylindrical chamber *E*. The product boils in this section at from 160 to 180 deg. F. and releases as water vapor a portion of its water content to the ejector condenser, carrying with it oxygen and volatile substances removed from the product. The intermediate float valve *G* controls the flow of product through pipe *H* into a third chamber *I* of lower pressure, where a still higher vacuum, usually 27½ to 28½ in. is maintained. The product upon entering this final chamber loses more water vapor and volatile substances and is cooled in the process to about 110 deg. F. The product is pumped from the bottom of the last chamber by a multistage centrifugal pump *Y* and is delivered to the cooler.

The amount of steam passing through valve *B* is in excess of that necessary to raise the product to the pasteurizing temperature. This free steam aids in the freeing and carrying away of dissolved oxygen and certain volatile substances from the product, such as may be imparted by feeds and weeds. The rise in temperature of the cold

water, forced through the ejector condenser by pump *Z*, is an indication of the amount of free steam and water vapor thrown off from the hot product in the reduced-pressure chambers. If the temperature of the product is approximately 110 deg. F. when it enters the Vacreator and it leaves the machine at 110 deg. F., then the amount of water added by the steam will equal the water lost from the product during the distillation process.

Vacreators are made in three sizes. The pasteurizing capacities in pounds per hour are (1) 2,500 (cream), (2) 5,000 (cream), (3) 12,000 (cream) and 15,000 (milk). Water requirements, in U. S. gallons per minute, are 17 to 24, 28 to 40, 32 to 46, respectively. The amount of steam required is 120 to 160 lb. per 1,000 lb. of cream (less for vacreating milk or ice cream mix). Motor requirements are 5, 7, and 18 hp., respectively.

### Success With Butter

Experiments at the Dairy Research Institute in New Zealand involved the manufacture of butter from cream having a strong feed flavor. Compared with flash pasteurization, vacreation brought about a marked improvement in the quality of the butter. An improvement also was effected when cream of the finest commercial quality was vacreated. When cream of lower grade—having an average acidity before neutralization and pasteurization of 0.44 percent—was vacreated, there was much improvement. But the improvement rarely was great enough to make possible the manufacture of the finest grade of butter from this cream.

Studies were made at the Oregon Agricultural Experiment Station to determine the commercial possibilities of the Vacreator as a pasteurizer for cream to be used in the manufacture of butter. When cream containing from 0.23 to 0.42 percent acid, before pasteurization, was used, the butter made from vacreated cream scored an average of 0.83 point higher than that made from vat-pasteurized cream, an improvement of much significance. "Split" churnings were made from 86 lots of cream. Of 86 churnings of vacreated-cream butter, 82 scored 92 points and above; of 86 churnings of vat-pasteurized-cream butter, only 39 scored 92 points and above. After storage for four months at 0 to 10 deg. F., the butter made from vacreated cream scored on an average 0.78 point higher than that made from vat-pasteurized cream. In a series of tests that involved the manufacture of butter from 17 lots of pronounced weed-flavored cream, it was found that vacreation was effective in removing the weed defect. Neither method of pasteurization was effective in removing an old cream flavor or a metallic flavor from the cream.

Feed and weed flavors are prevalent in butter made in Middle-western states. It was reported that feed flavors were more prevalent than weed flavors in Iowa. A series of tests involving the manufacture of butter from vacreated cream and vat-pasteurized cream were made at the Iowa Agricultural Experiment Station. A total of 24 lots of cream was used, these ranging in acidity from 0.15 to 0.29 before neutralization and pasteurization.

An improvement in score, similar to that noted in Oregon, was brought about by vacreation. The process increased the average score of the fresh butter 0.97 point. The improvement was maintained during storage of the butter at 38 deg. F. for six weeks and at 0 deg. F. for six months. A somewhat greater improvement took place when cream of lower quality was used.

Butter made at the Iowa Agricultural Experiment Station from fine-quality vacreated cream was sent to ten different state and national scoring contests. The scores ranged from 93 to 95 points. Although the cream was pasteurized at a temperature of from 190 to 200 deg. F. in the Vacreator, "no deleterious heated or cooked flavors resulted."

In studies at the University of Manitoba, Winnipeg, Canada, with nine split churnings of butter made from fine-quality cream that averaged 0.22 percent in acidity, vacreation increased the average score of the butter 0.63 point as compared with the average score of the butter made from cream vat-pasteurized at a temperature of 180 deg. F. for 10 minutes. After storage for four to six weeks at 45 to 50 deg. F., the difference was 0.96 point, and after storage for six months at 0 deg. F., the difference was 1.26 points. In both cases, the difference was in favor of the butter made from vacreated cream. The improvement effected was greater with first-grade cream that had an average acidity of 0.48 percent. It was found that vacreation was effective in removing feed and weed flavor. There was an average increase of 3.11 points in the score of butter made from feed, and weed-flavored cream as a result of vacreation.

### Improve Cheese

The earliest studies made in the application of the process to the pasteurization of milk for cheese were conducted at the Matamata cheese factory in New Zealand from November, 1934, through March, 1935. At this plant, all milk received was pasteurized by the conventional flash method and manufactured into cheddar cheese. In this case, therefore, the comparison was between cheese made from flash-pasteurized milk and that made from vacreated milk. The results disclosed that important advantages accrued from the vacreation of the milk, the most sig-

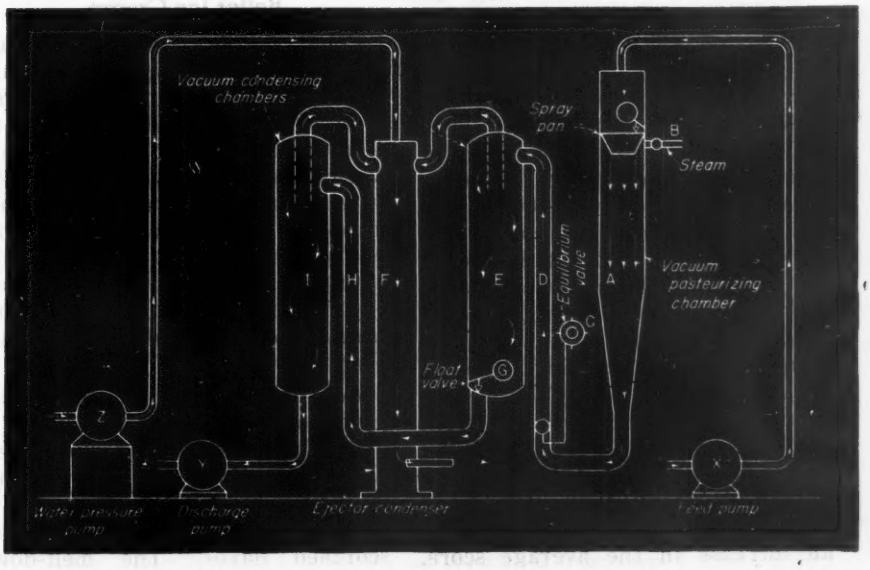



**FIG. 1. Flow cycle of the Vacreator.**

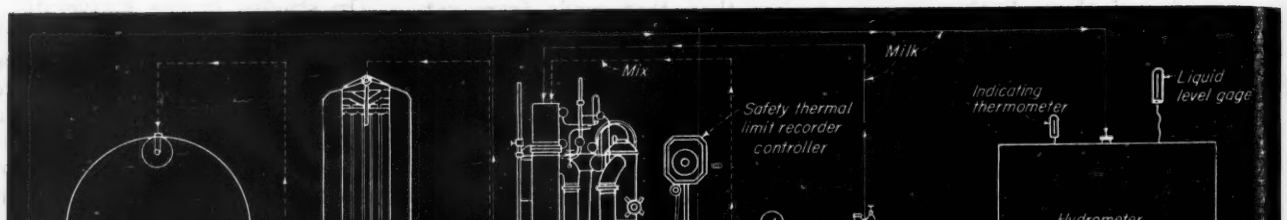



FIG. 2. Equipment for condensing milk and for mixing, homogenizing, pasteurizing, cooling and storing ice cream mix.

nificant being improved flavor, somewhat better yield and accelerated ripening of the cheese.

It was found, however, that a rancid flavor would sometimes develop in the cheese, and it was concluded that the time factor in the Vacreator was not sufficient to be reliable at the pasteurization temperature used (160 to 170 deg. F.). No thought was given at that time to the possible effect of vacreation at these temperatures on the milk enzymes.

Nothing further was done until 1941, when experiments at Oregon Agricultural Experiment Station indicated the possibility of using the vacreation method for the treatment of milk to be used in the manufacture of cheddar cheese.

In order that the lipolytic milk enzyme should be destroyed or inactivated during the vacreating process, preliminary experimental work was conducted to establish a practical preheating-vacreating temperature combination.

In the subsequent cheese experiments, the milk was preheated by continuous means to 145 deg. F. and vacreated at 165 deg. F. Fifteen lots of milk of average quality was used. When the initial count raged from 2,500 to 4,800,000 per milliliter, with a geometric average of 75,500, the numbers of bacteria present in the vacreated milk ranged from less than 100 to 56,000. When the initial count was 500,000 or less, the numbers of bacteria present in the vacreated milk ranged from less than 100 to 15,000 per milliliter. Cheese from 12 lots of milk was scored by a Federal grader. The scores of the raw-milk cheese ranged from 88 to 91 and averaged 89.7 points, while the vacreated-milk cheese scored from 89.5 to 92 and averaged 90.92 points. Thus there was an increase in the average score, due to vacreation, of 1.05 points.

The fact that rancidity developed, as a result of milk lipase activation, when milk was vacreated at moderate temperatures (160 to 170 deg. F.) and when the preheating temperature did not exceed about 110 deg. F. was turned to good account at the Iowa Agricultural Experiment Station. Realizing that primary rancidity development is a desirable and necessary concomitant to the proper functioning of the mold, *Penicillium roquefortii*, in converting the lower fatty acids to methyl ketones and producing a pleasing flavor, the Iowa investigators have shown that Roquefort-type cheese of improved quality is made when the milk is processed in this manner.

The Vacreator is now being used successfully for the pasteurization and treatment of milk for cheddar cheese in several commercial cheese factories located in the southeastern part of the United States. A personal investigation in the field convinced the author that vacreation of milk for cheddar cheese has considerable economic value.

## Better Ice Cream

Could ice cream mix be vacreated? And if so, should the mix be homogenized before or after the process? The members of the dairy department staff at Oregon State Agricultural Experiment Station were willing to conduct experiments involving the application of this new process to ice cream mix. But despite its reported successful application for this purpose in Australia, they were skeptical of its practical use.

Contrary to expectations, ice cream of a delectable flavor and a fine body and texture was obtained. Even though the mix was pasteurized at 200 deg. F., there was a complete absence of any cooked or scorched flavor. The melt-down property of the ice cream was satisfactory. The results were so outstanding that it was decided to use this method of treating ice cream mix as standard for all the mix handled in the Oregon State College dairy products laboratory. It was felt that the adoption of homogenization before pasteurization would be in harmony with the best thought and most advanced ideas of sanitation and thus would be in the best interest of public health. The ice cream mix was therefore subjected to homogenization before it entered the Vacreator.

This method of treating ice cream mix was also studied at the Iowa Agricultural Experiment Station. In 19 trials, the range in score of ice cream made from vat-pasteurized mix when scored fresh was from 42.50 to 45.00, with an average score of 43.69 points. The fresh scores of the vacreated-mix ice cream ranged from 44.50 to 46.00, with an average score of 44.98 points. This gave a difference in the average score of 1.29 points in favor of the vacreated-mix ice cream. It was found that there was less tendency for the vacreated-mix ice cream to develop a stale, oxidized or metallic flavor during storage of from one to four weeks.

Vacreation of ice cream mix has now been adopted as standard practice in a large ice cream factory in Pennsylvania, in several plants farther east, and in two ice cream factories located in Canada. The war scarcity of machines has inhibited the adoption of the process by many other ice cream manufacturers.

## Used for Condensing

After a good deal of experimentation with vacreation, a simple method of condensing skim milk, or whole milk, for ice cream mix has been developed at Oregon State College. Condensation of the milk-cream-sugar-egg-gelatine mixture

was found possible. But this was not considered to be as practical a method as was the first procedure of first condensing the milk to the desired density, followed by mixing the ingredients, then homogenizing, vacreating and cooling.

The new method of condensing is as follows: (1) Place the determined amount of milk in the ice cream mix tank; (2) disconnect the equilibrium valve; (3) circulate the milk through the Vacreator, heating it first to 200 deg. F. by means of a preheater; (4) omit the use of steam in the Vacreator; (5) maintain a vacuum of 25 in. in the second chamber; (6) maintain a vacuum of 27½ in. or higher in the third chamber; (7) allow the milk from the Vacreator (now at about 110 deg. F.) to return to the mix tank; (8) continue the process until the proper density is obtained, as determined by a Baumé hydrometer or by means of a specially constructed density tester.

With the "Baby" Vacreator, a maximum of 500 lb. of water could be removed from the milk per hour when the milk was circulated through the apparatus at a rate of about 5,000 lb. per hour. With the "Junior" Vacreator, a maximum of about 1,000 lb. per hour of water was removed when about 10,000 lb. of milk per hour was circulated.

Measurements of the amount of steam, water and electricity indicated that the Vacreator could be efficiently used for condensing milk. The method is simple and requires little supervision. The condensed milk, whether obtained from skim milk or whole milk, has a desirable flavor and physical property. It is free from a cooked flavor. The standard plate count of the condensed milk, using good-quality commercial manufacturing milk, is practically nil.

This method of condensing milk is now regularly used in the Oregon State College dairy products laboratory. Ice cream of an exceptionally low bacterial content, and which is phosphatase negative, is obtained. The product has been regarded as excellent by students and faculty members.

### Pasteurizing Efficiency

Favorable reports of the pasteurizing efficiency of the Vacreator have been made by several experiment stations. And one aspect of Vacreator pasteurization may be of much greater importance than is as yet generally recognized. We refer to the apparent fact that with this

(*Turn to page* 208)

# Why Short-Circuit Protection Pays

By D. L. BEEMAN, Industrial Engineering Division, General Electric Co., Schenectady, N. Y.

**Unless circuit breakers and fuses in the plant electrical system can handle short-circuit current, dangerous and uneconomic conditions result. Here are pointers**

IF a short-circuit current exceeds the interrupting capacity of the protective device—the breaker or fuse—this device may not successfully open the circuit. And such inadequate protective equipment is both dangerous and uneconomical.

When the short-circuit device fails, a condition equivalent to a short circuit occurs within the device itself. This condition releases a tremendous amount of uncontrolled energy within the housing of the device, and may cause intense heat or a violent explosion. This explosion may cause parts to be hurled about with high velocity, and may cause much hot gas to be emitted and spread over a distance of several feet. In many old low-voltage systems (600 volts and below), inadequate oil-filled breakers are used. These breakers usually have a very low interrupting capacity rating. And when they attempt to open short-circuit currents beyond their rating, burning oil may be thrown over a considerable area, and a major fire may result.

Here's why inadequate devices are not economical: When the device fails, the condition is equivalent to a bus fault, and hence causes much more load to be shut down, with consequent loss of production.

### Case History

In a New England plant, to take an example, a fault occurred on a motor circuit. The branch-circuit fuse (that is, the fuse in the circuit to the motor) was inadequate, and consequently blew up and caused a fault. The main fuses between the source and branch-circuit fuse were too small, and failed. The main breaker was also of insufficient interrupting capacity, and it failed, too. The fault was finally cleared when the power company's circuit breaker tripped open. In this case, the loss of production of the entire plant was caused by a fault that could have been confined to one small motor circuit.

Certain steps can be taken to insure adequate short-circuit protection in a plant distribution system. These steps are: (1) Accurately determine the potential short-circuit currents. If the plant operator cannot calculate these currents, then his consulting engineer, or the utility company's engineer, or the application engineers of large electrical manufacturers can calculate them for him. (2) Install only circuit breakers or fuses of known adequate interrupting-capacity rating. Devices of adequate rating can be obtained to meet the requirements of all industries. And don't forget to allow for future load growth.

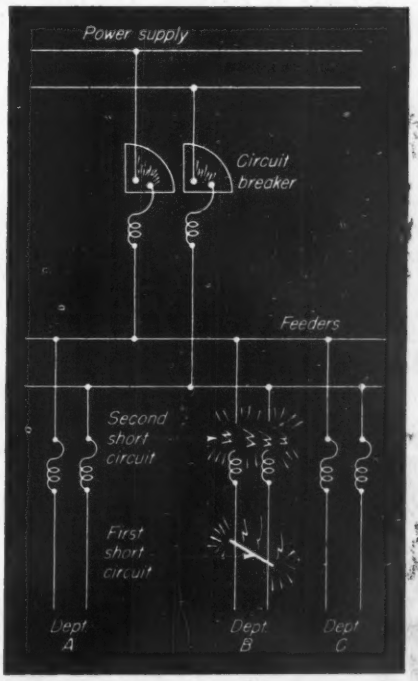
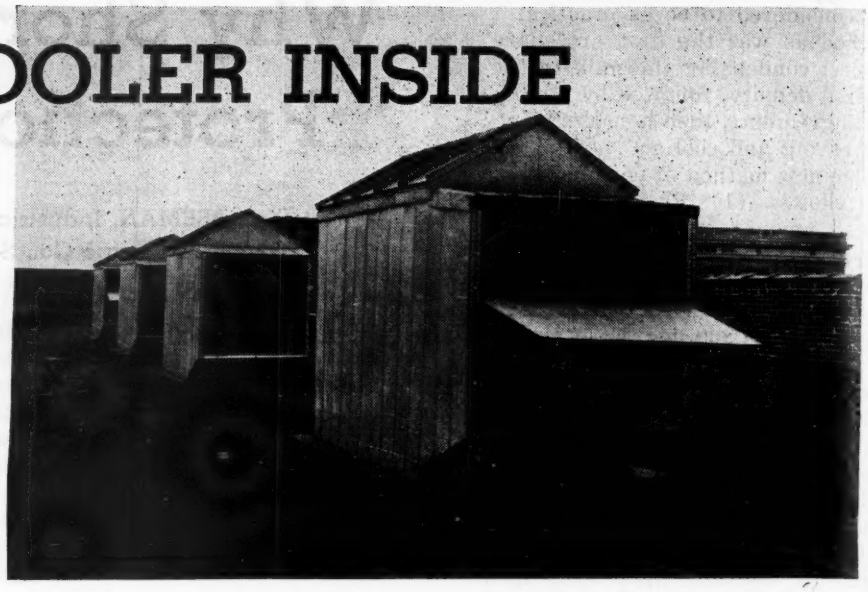



**FIG. 1. Inadequate circuit breaker interrupting capacity in Department B caused main breaker to shut down all departments.**

# 10 DEG. COOLER INSIDE

**Exhaust fans on roof lower temperatures in working areas of candy plant in Georgia to improve working conditions. Fifteen 5-ft. fans change air in 40 seconds**

By MAC TORBETT,
General Manager,
Bob's Candy and Peanut Co.,
Albany, Ga.



View on roof, showing four of the 15 fans installed to improve working conditions.

PRODUCTION has been helped, employee turnover definitely decreased and the general temper and morale of the working force improved by putting exhaust fans on the roof at Bob's Candy and Peanut Co., Albany, Ga. The reason for these important benefits is simply that the temperature inside the working area has been lowered 10 to 15 deg. F. and air circulation provided to making working conditions much more pleasant in an area where relief from excessive summer heat always is acceptable.

Fifteen 8-blade fans, 5 ft. in diameter, were installed to change the air in the working area about once in every 40 seconds. The fans operate at 355 r.p.m., and at this speed each will handle 48,000 cu. ft. per minute. Each one is individually driven by a 3-hp. motor operating on 3-phase, 60-cycle power at 1,750 r.p.m. To give flexibility and economy to the system, separate control is provided for each fan.

The fans are all mounted in penthouses on the roof and located so as to draw the air from the points where heat is released on the second floor, as well as from the working areas in general.

The lower floor of the two-story structure is being used for storing and shipping, the offices also being on this floor. But most of the plant workers are on the second floor, where all manufacturing operations are located. This floor is divided into three sections, and in each one is equipment that generates heat.

Our president, Bob McCormack, has a reputation for looking after the interests of his help, and this installation of fans is evidence that his reputation is deserved. Neither the fans, the building changes required to install and house them, nor the power used plays any direct part in the production of candy. But the indirect effects are worthy of consideration. Effective temperature where people are concerned depends upon the humidity, the dry-bulb temperature and the movement of air. And in our case, the last two have been improved to give us more comfortable working conditions.

General view of the working floor under the fans, showing one of several production and packaging lines.

# Less ART and More SCIENCE In Cheese Manufacture

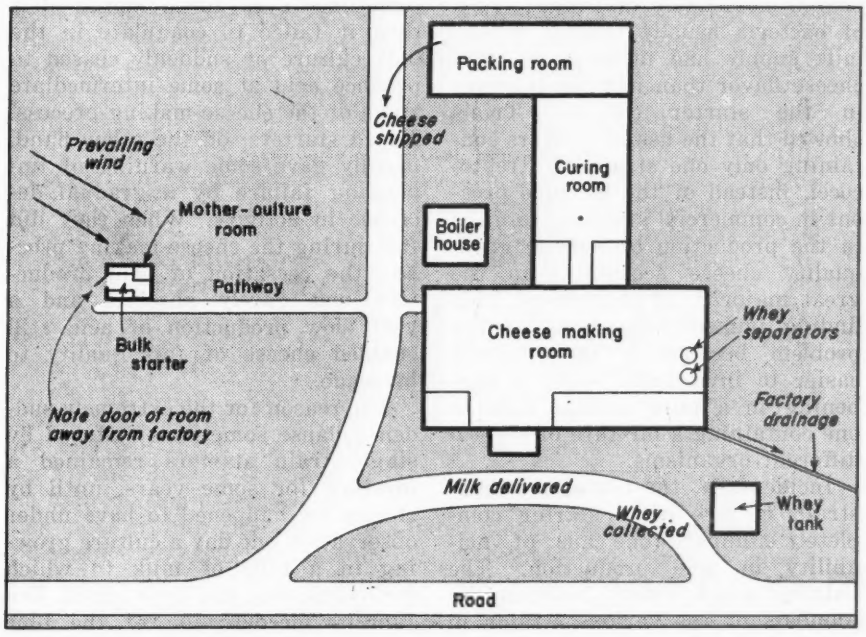
By H. R. WHITEHEAD, Chief Bacteriologist,
Dairy Research Institute, Palmerston North, N.Z.

**"Scrubbing brush" cleanliness will not eliminate starter trouble. Proper factory construction and operation, by controlling starter activity, can convert cheese making into a predictable and almost routine process**

ONE of the essentials of the cheddar cheese manufacturing process is a regular and continued formation of lactic acid in the curd. The acid is produced by lactic streptococci which, during their growth in the warm curd, ferment the milk sugar. At one time, when milk was produced under more primitive conditions on the farm, acid-forming bacteria present in the milk as contaminants formed all the acid required in the cheese making process (and sometimes much more). But as farmers gradually began to deliver "cleaner" milk, and with the advent of the use of the pasteurizer in cheese factories, the addition to the cheese milk of a "starter" culture of acid-forming bacteria became essential. And the cheese maker began to talk of "starter trouble" when the culture did not behave as he wished it to do.

For the last 20 years or more, bulletins and pamphlets have been issued by experiment stations and commercial firms purporting to show that extreme care and cleanliness will enable the cheese maker to preserve starter cultures in a constant state of activity—except for a few occasional failures which are apparently to be regarded as "acts of God." The commercial firms usually conclude a pamphlet by recommending frequent renewal of the culture (obtainable from them). The fact of the matter is that where starter cultures are concerned, cleanliness of the scrubbing-brush type does not achieve the results it deserves.

That was the position we faced at this Institute in 1928 when we were asked to tackle the cheese starter problem as one of our main activities. In our experimental factory, we soon were made painfully aware that extreme care and cleanliness in themselves would not prevent the failure of starters. There was obviously some unknown factor not under control even when all the accepted precautions were taken. On the other hand, failures of similar cultures kept in the laboratory were very rare. We therefore made a start on the problem from the bacteriological side to learn much more about the habits and properties of the various streptococci which go to make up cheese starters.




**Layout of plant with starter building and whey tanks isolated from the cheese factory itself. Note door of starter building facing away from the factory. Also direction of wind relative to location of starter building, cheese factory and factory drainage.**

### Single-strain Cultures

In the first place, we raised the question: Is a mixture of bacteria necessary in a cheese starter? It is well established that a culture containing both acid-producing and flavor-producing types of bacteria is desirable in butter manufacture. The necessity for a similar mixture in cheese starters did not seem to us equally certain. Actually, it ap-

### Bacteriophage In the Food Plant!

**This article on one unusual quality-control problem and its solution should be carefully studied by every branch of the food industry which utilizes microbial life in the processes by which the food is prepared.**

**To us, the discovery of bacteriophage in food processing is startling. Although this bacteriophage problem and its solution come out of the cheese industry, we wonder if any parallel experiences may occasionally occur in other branches of the food industry, such as pickle or sauerkraut manufacture, beer, wine or other fermentation processes?**

**New Zealand is so far away from the United States that it is too little known in this country. The quality of the research and development work carried on in New Zealand's Dairy Research Institute is of an order that commands admiration.—THE EDITORS.**

**The Whareroa Factory of the Hawera Dairy Co. has the starter building, at the left, well removed from the factory, right. The building beyond the path in the center is the manager's house. The layout is determined by the prevailing wind and drainage.**

peared more likely that other types of bacteria usually present in the milk supply had more to do with cheese flavor than had the bacteria in the starter culture. Trials showed that the use of starters containing only one strain of streptococci, instead of the mixture present in commercial starters, resulted in the production of normal good-quality cheese acceptable to the great majority of consumers. This finding immediately simplified the problem because it is obviously easier to investigate what is happening in a pure culture than in one containing a mixture of several different organisms.

Incidentally, the use of a single-strain culture as a starter completely eliminates one cause of variability in acid production. The balance which exists between the numbers of the various strains in a mixed culture is easily upset by changes in the conditions under which the culture is kept. A slight variation in the temperature of incubation from day to day, for instance, may favor one strain more than another and thus cause the properties of the culture to alter. In a single-strain starter, this competition between strains does not exist.

When single-strain cultures first were put into use as cheese starters, an enormous improvement was observed. They were more active and much more regular in activity from day to day than the general run of mixed starters. Cheese makers were enthusiastic about the new departure until they discovered, in due course, that starter trouble still occurred and in a more acute form than ever. Usually a single-strain starter behaved with exemplary regularity for a week or two—sometimes even for a month—but then it failed to coagulate in the bulk culture or suddenly ceased to produce acid at some intermediate stage of the cheese-making process. Mixed starters, on the other hand, usually gave some warning of impending failure by a gradual decrease in activity. When they did fail during the cheese-making process, the cessation of acid production was rarely absolute and a very slow production of acid still enabled cheese of fair quality to be made.

The reason for the extremely sudden collapse sometimes suffered by single-strain starters remained a mystery for some years, until by chance we happened to have under observation one day a culture growing in a tube of milk to which methylene blue had been added. The familiar decoloration of the blue due to the growth of the starter organisms took place a few hours after the start of the experiment, but the color returned in the tube half an hour later. Under the microscope the milk showed complete absence of bacteria, although they were known to have been present an hour earlier.

This crucial observation suggested that the organisms had perhaps been destroyed by bacteriophage (or phage), a bacterial virus, submicroscopic in size, which is known to have a similar dissolving action on disease-producing bacteria. Further experiments showed that this was indeed the explanation for this phenomenon and for the sudden failures with single-strain starters. Cessation of acid production in the starter culture or in the cheese vat coincided with destruction of the starter bacteria by phage.

At first, we had the impression that starters generated phage spontaneously within themselves under the influence of some particular condition of treatment. For instance, it appeared as though aeration or vigorous stirring of the starter milk after it had been pasteurized and before it had been inoculated stimulated the subsequent appearance of phage.

Various modifications in the methods used in handling the starter cultures were tried, and at one stage in the experiments we believed that the use of a massive inoculum coupled with an avoidance of stirring of the milk eliminated the appearance of phage. But further outbreaks of starter trouble showed that we were wrong.

Finally, it was found that phage was regularly present in high concentration in cheese whey and hence was broadcast throughout the cheese factory. More significant still, the splashing of whey created an air-borne infection which very readily gained access to starter cultures. Thus the seemingly spontaneous appearance of phage in cultures was really due to infection from the atmosphere. The apparent effect of aeration or stirring of the starter milk in stimulating the appearance of phage could be similarly explained.

In a word, air-borne phage infection is the key to starter trouble. It explains why the most extreme scrubbing-brush cleanliness is of no avail so long as the culture is exposed to phage-carrying particles floating in the air. The infection gets into the starter as easily as a mosquito will pass through wide-mesh wire netting.

If the starter is to be preserved in an active state, special precautions have to be taken with the specific object of excluding air-borne phage infection. Various safeguards have been tried out in commercial practice and the most successful up to the moment, based on three main principles, are the following.

### How To Keep Phage Out

**1. Distance from Center of Infection**—The starter is prepared in a special building as far removed from the cheese-making room as possible—up to 40 yd. in practice.

The cheese vat is a huge open culture of starter bacteria upon which the phage thrives. Each day a high concentration of phage develops in the whey. Usually it develops a little too late to stop the production of acid and thus spoil

the cheese, but it continues to multiply in the whey after the latter has been run from the vat.

Thus phage is broadcast wherever whey is splashed, from taps, pipes and whey separators. Farmers taking whey home for the feeding of pigs distribute it throughout the countryside. But the air-borne infection, really air-borne droplets of whey, must normally grow less and less intense with increasing distance from the center of infection, the cheese vat.

This can be demonstrated by deliberate exposure of susceptible

**The New Zealand milk can holds approximately 25 Imperial gallons. The long skirt of the loosely fitting lid dips into the water bath used for heating and cooling during sterilization of the starter. This insures that all air must enter through the cotton plug. This type of lid has been found more foolproof than one requiring gaskets or clamps.**

starter cultures in various positions in and around the factory. Failure occurs most regularly in cultures exposed in the factory and becomes less frequent as the place of exposure becomes more remote from the factory. Obviously, therefore, the starter—both mother culture and bulk—is safer from phage infection when it is prepared at a distance from the factory. But even at the greatest distance practicable there may possibly be a trace of air-borne phage, consequently other safeguards are still necessary.

2. **Filtration of Air**—Since the phage is carried in minute droplets of whey, it is possible to remove it from the air, given a fine enough filter.

Nonabsorbent cotton wool as used in bacteriological laboratories will remove air-borne phage, provided it is used in sufficient quantity for the volume of air it is required to filter.

In applying the filtration principle to the protection of starter, both mother and bulk cultures must be prepared in sealed vessels, each provided with a mouth or spout which is plugged with cotton wool. The plug is inserted before the sterilization of the starter milk in the vessel. It serves to filter the air that reenters the vessel as the milk cools and is not removed at all during the preparation of the starter, except for a few seconds while the sterilized cooled milk is being inoculated.

Conical flasks of heat-resistant glass are convenient in factories for the preparation of mother cultures. Various types of metal vessel can be used for bulk starter preparation, but the size must be such that it is possible to heat and subsequently cool the milk without the necessity for stirring, because the vessel must not be opened. Vessels holding up to 20 gal. have proved practicable.

3. **Aseptic Technic**—Gross infection of the starter during the process of inoculation must be avoided, otherwise all other precautions are of no avail.

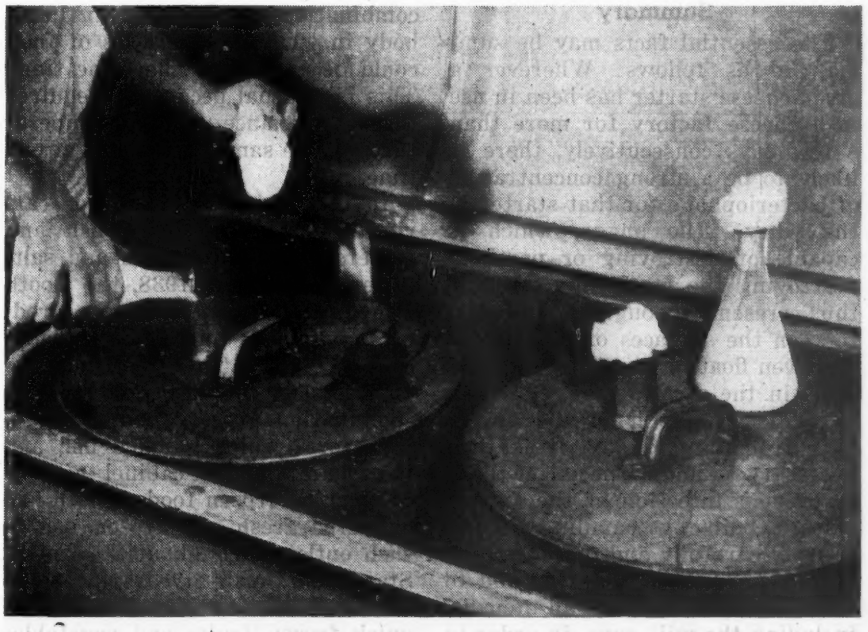
The cheese maker almost inevitably has whey on his hands and clothes and will infect the starter during his handling of it unless he has an appreciation of aseptic technic and puts it into practice. He must discard whey-wet clothing and thoroughly wash his hands and arms before inoculating or setting the starter, and preferably he should use heat-sterilized pipettes for the inoculation of mother cultures. If starter is handled in such a way that phage is excluded, there never will be any question of infection with undesirable bacteria. Netting which excludes mosquitoes necessarily excludes bigger insects.

Where the above three principles have been thoroughly applied in New Zealand commercial practice, it has been found possible virtually to eliminate failures of the starter culture.

### Origin of Phage

The cheese maker may ask—where does the phage in the air of the dairy factory come from in the first place? This question cannot be answered with certainty, but from all the evidence available there is good reason to believe that the following sequence of events occurs:

Particles of phage lie dormant in dust everywhere, just as do many bacteria and other microorganisms. Phage cannot multiply until it encounters its special prey, the starter bacteria. Sooner or later, dust carrying the appropriate phage falls into a cheese vat, which is a huge exposed culture of starter bacteria. The phage multiplies several thousand-fold on the first day, so that the cheese whey contains an appreciable concentration. Thereafter, reinfection of the vat occurs regularly from day to day because it is impracticable, and in any case rarely attempted, to sterilize every utensil with which the infected whey has come into contact. Under



**Inoculating the bulk starter contained in cans which stand in a water bath.**

the usual conditions of cleanliness, the phage carried over from day to day does not become strong enough during the five or six hours occupied by the manufacturing process to destroy the starter and cause cessation of acid development. But there have been instances of failure due to slipshod cleaning of the cheese vats.

Under normal circumstances, the phage-infected whey drawn from a vat is passed through a separator to recover butter fat, and the splashing involved in the process broadcasts finely divided droplets of whey which float in the atmosphere for many hours. These create the danger of infection of the starter culture, with a much more drastic effect than infection of the cheese milk from utensils. Phage which falls into a culture multiplies overnight on the starter bacteria and is already several thousandfold stronger when the starter is added to the milk in the cheese vat next day.

### Multiple-strain Cultures

Commercial cultures containing several strains of streptococci are less liable to be completely wiped out than single-strain cultures because different phages are to some extent specific and do not attack more than a few strains of streptococci. Thus mixed starters usually suffer only partial failure when infected. But failure, whether partial or complete, leads to spoilage of cheese and disorganization in the factory, so protection against phage is desirable whatever the type of starter used.

### Summary

The essential facts may be summarized as follows: Wherever a given cheese starter has been in use in a cheese factory for more than a few days consecutively, there is likely to be a strong concentration of bacteriophage for that starter in the whey. The phage, which is capable of destroying or partially destroying the starter bacteria, is thus present throughout the factory on the surfaces of all utensils and even floating in a finely divided state in the air. To get regularity in acid production in the cheese vats from day to day, it is then necessary to adopt special methods to prevent infection of the starter culture both by handling it extremely carefully and by protecting it from air-borne infection; and to sterilize the surfaces of all utensils, including the milk cans, in order to eliminate whey contamination.

**Fresh fish, as well as quick frozen fish, fruits and vegetables, are delivered from separate compartments of this refrigerated truck. The body, designed by the Booth company for its double delivery needs, is of Lindsay structure on a 2-ton chassis.**

# Fresh and Frozen On Same Delivery

**Trucks with separate compartments, maintaining different temperatures, lower distribution costs by permitting delivery of fresh fish along with frozen fish, fruits and vegetables**

NECESSITY for delivering both fresh and frozen foods to the same customers led Booth Fisheries Corp., Chicago, to develop a combination refrigerated truck body in which both classes of food could be carried at the same time. This is unusual because it requires the maintenance of two temperatures in the same truck body at one time.

In the beginning, the foods carried consisted of fresh fish and oysters and frozen fresh and salt-water fish. But in 1938, the Booth company added to its sales products a line of quick frozen fruits and vegetables. This was a natural development in the trend toward combination grocery and meat retail stores which handled fish and also maintained a cabinet capable of stocking frozen foods. Booth had delivered fresh and frozen fish to such outlets throughout the United States for many years prior to 1938 and the addition of the line of quick frozen fruits and vegetables helped to increase the company's sales to the same outlets. In 1944, Booth's sales exceeded $22,000,000, of which approximately $18,000,000 was in fish.

Altogether, the Booth company maintains a fleet of 118 motor trucks, of which 101 are operated in the United States and 17 in Canada. The company owns and leases trawlers to catch the fish. It also purchases fish at ports on the Atlantic, Pacific, Great Lakes and other inland lakes.

In the transportation of the fresh fish from these ports to its processing plants for redistribution as fresh or frozen fish, the company uses rail, common-carrier trucks and its own fleet of motor vehicles, as best suits the circumstances. Its own trucks may pick up loads of fresh fish at the ports on one day and on the next make delivery to the wholesaler or the retail store.

The wholesale and retail outlets may be entirely within a large city on one route, while on another route the outlets may all be in the

country, a peddle truck taking from Monday to Saturday to cover the latter route. These diverse requirements made necessary the development of a highly flexible unit that could provide ample refrigeration under all conditions.

The combination fresh and frozen food truck shown on these pages is the most recent development, even though it goes back to 1941. However, the Booth company has "on the boards" the development of a new body for all-frozen foods. Its production awaits the release of materials.

The body illustrated here is mounted on a 2-ton chassis, with a 160-inch wheelbase. It carries a net payload of 5,000 lb.

The body itself is of Booth design and is constructed on the Lindsay Structure plan for lightness. It is insulated with cork in the floor and with different thicknesses of Dry Zero in the walls and roof, as shown in greater detail in the accompanying longitudinal and transverse section drawings.

**Quick frozen fruits and vegetables are packed in cartons such as this and carried in the same compartment as frozen fish, since there is no odor transfer when foods are frozen.**

The body is divided into two compartments, the front one for the frozen fish, fruits and vegetables and the rear one for fresh fish, oysters and products in glass —such as pickled herring. The front compartment is reached through a refrigerator-type door on the right or curb side. Access to the rear compartment is through a step and rear door.

Both compartments are refrigerated by "hold-over" plates with a self-contained compressor carried in a special compartment on the left side of the body. The hold-over plates are of different length, width and thickness to provide the different body temperatures required.

In the frozen food compartment, the temperature is kept at -5 deg. to +5 deg. F. In the fresh-fish compartment, the temperature range is between 30 and 40 deg. F.

The frozen fish and the frozen fruits and vegetables are carried in the same compartment, since there is no transfer of odor so long as the proper temperature range is maintained. Shelves are provided in both compartments for convenient stacking of the load.

Twelve of these bodies had been put into service by 1941, and several stages of development preceded the design as shown. The earlier bodies of this type had ice and salt hoppers to provide the necessary refrigeration. But the ice and salt system did not prove entirely satisfactory because of the relatively large volume of space taken up inside the body by the hoppers, which were filled from the roof. The salt also corroded the interior metal lining of the body until holes developed, then it ruined the insulation. Moreover, the ice hoppers had to be filled at least once daily.

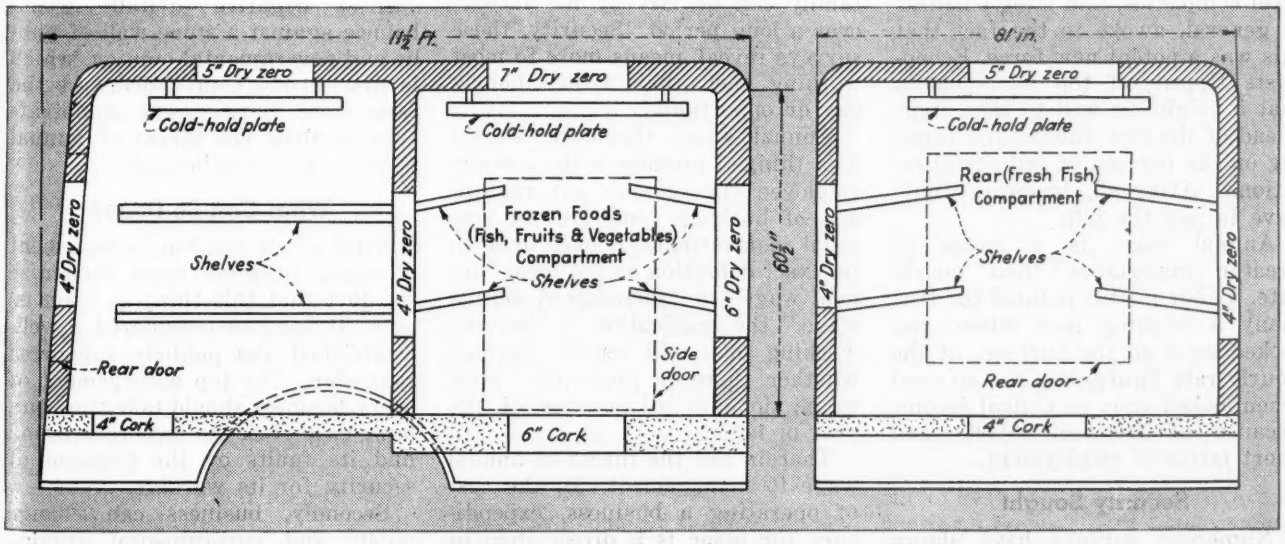
In the present designs, the hold-over plates, hanging from the ceilings of the two compartments, take up little loading space. With the unit carrying its own compressor, the system is entirely self-contained, and no reloading is required as with ice and salt.

The bodies have sheet-metal exteriors and are lined with galvanized metal on the inside. The roof material is canvas, painted with aluminum to better refract the heat of the sun.

All the Booth vehicles are painted a standardized color. The base color is yellow, with red trimmings and with front and rear fenders in black.

The preliminary design of the improved body for all frozen foods contemplates the use of four, instead of two, hold-over plates. They are to be arranged in two groups, one above the other toward the sides of the body, with a center aisle between and a full-length 70-in. walk-in door at the rear. The lower plates on each side would form shelves to carry the load.

The upper plates suspended from the ceiling may be 54x18x2⅝ in. The lower plates may be the same length and width, but only 1 in. thick. The refrigerant may be Freon or some other medium, depending upon what first becomes available. A 1½ hp. compressor completes the refrigerator unit.




**Longitudinal and transverse cross sections of the combination fresh and frozen foods body, showing the cold hold-over plates suspended from the ceiling of the compartments. The fresh foods are reached through a rear door, while a refrigerator-type door, on the curb side of the truck, gives access to the frozen compartment. Temperatures range from —5 deg. to +5 deg. F. in the frozen compartment and from 30 to 40 deg. in the fresh foods space. Cork is used for the floor insulation. Dry Zero for the roof and sides.**

# THE ANNUAL WAGE —Is It a Promise or a Threat?

**American business and industry can avoid the crippling effects of all that is embodied in the annual-wage proposal by stabilizing production to provide yearly employment. Here is how one food company did it**

By THOMAS R. REID, Director,
Personnel & Public Relations, McCormick & Co., Baltimore, Md.

THERE is a new phrase in the language of labor as we enter the postwar period. It is "annual wage." It has a nice ring. It catches the public fancy. It implies a new security for the working man. It's as catchy and as tricky as some other innocent sounding phrases such as "grade labeling."

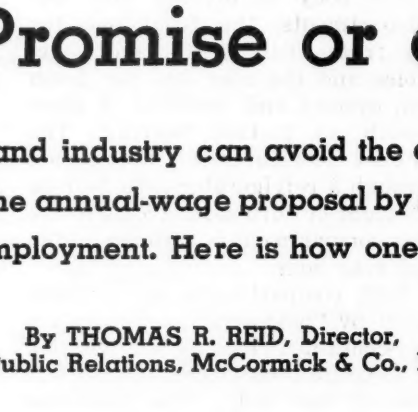
Annual wage first came into prominence when, in the midst of the war, the steel workers were looking about for something that could be written into their contracts, to grant an advantage without violating the Little Steel Formula on wage increases.

Almost immediately the phrase caught on. Labor organizations took it up as a new possibility for all contracts. Government became interested to the extent of setting up a special committee, under the Director of Reconversion, to study the question and make recommendations from government about it. Steel companies, and later business in general, awoke to the fact that this was a potent new force. Economists tipped off top management that it might be well to take steps ahead of the new bandwagon forming on the horizon of industrial relations. After all, business would have to pay the bill.

Annual wage is a factor of greater importance than hourly rate. Labor readily pointed out that many a working man whose pay looked good on the surface, at the hourly rate figure, was not so good when looked upon as annual income because of frequent layoffs and short terms of employment.

### Security Sought

Numerous surveys have shown that to the average employee, security is not only *a* prime factor, but *the* prime factor. More than anything else, the working man wants to know that the needs of his family can be met by his income over a long period. Security, these surveys reveal, means more to most working men than either hourly pay or opportunity.



THOMAS R. REID

Annual wage, therefore, stands as a thing of promise to the average employee. It connotes pay regardless of business conditions or seasonal requirements. Looked upon in its exact definition as the term "annual wage" or "guaranteed annual wage," the implication is that the working man will receive his pay whether there is productive work to be done at all seasons of the year or not.

Therein lies the threat of annual wage to management. In the cost of operating a business, expenditure for labor is a direct item of expense. It is not good economics to pay a wage for work not performed. A wage is justified only if it results in production that can be sold.

This fundamental fact immediately comes to light when any business management sits down at the conference table to take a look at the question of annual wage. The difficulty is that in the fanfare and glamour of employe security, advanced in favor of annual wage, it is frequently overlooked.

To the general public, annual wage sounds easy, and seems reasonable and logical. Government apparently feels that it is needed and feasible—otherwise it would not designate a committee to study it. Labor organizations definitely are bringing all their powerful forces to bear on building public and governmental opinion toward the achievement of annual wage.

This puts business management squarely in the middle. If business screams too loudly against annual wage as an outright impossibility, such a negative attitude would bounce against a stone wall of public and governmental opinion, which is now firmly established. At the same time, management cannot afford to allow the threat of annual wage to go unchallenged.

### What Can Be Done?

First of all, the top management of every business must recognize the fact that this thing is upon us now. It must be considered a well-established and publicly supported campaign. The top management of every business should take time out, now, to analyze its own record and find its faults on the problem of security for its workers.

Secondly, business can change public and governmental opinion gradually and skilfully by telling its own story on the annual wage question, by altering the definition

of the term in the public mind to fit reality instead of theory, and by taking steps on its own initiative to do something about greater security for its employees in their jobs, before being forced to do so by labor organizations or government on their own terms.

While annual wage, in its strict sense of pay for work not performed, would wreck individual business firms and weaken the general economy, there are steps that can be taken in perfect safety.

We should first substitute the term "employment stabilization" or "steady jobs" for the catchy but impractical term, "annual wage," in the public mind. Then, having presented not an outright refusal to cooperate, but an alternate that will be practical for everybody, business should put its own houses in order on employment stabilization practices.

Employment stabilization is a sounder solution of the problem of meeting workers' demands for security because, first of all, it represents a guarantee of work rather than a guarantee of pay. A company which begins a program toward employment stabilization commits itself to nothing more than a firm intent to do everything it can without injuring its financial structure to give its employees more weeks of work throughout the year.

Furthermore, employment stabilization permits degrees of extent, in contrast to annual wage, which implies going all the way at one time. Any business that sits down to take an objective look at its operations can find ways and means to give employees more work throughout the year, at least in some departments, or at least to the extent of adding an additional few weeks' pay to the employees' annual income.

To do so requires two things: First, a recognition of the fact that employees have a right to such consideration, and that appreciation for such steps properly taken in their behalf must inevitably result in improved employee morale. This is directly reflected in improved employee efficiency. The second requirement is the exercise of the same type of resourcefulness and ingenuity toward this problem that management applies so effectively in the production and merchandising of its products.

The food industry has pioneered notably in ingenuity toward employment stabilization. Of the five most widely known plans in operation in American business today for giving employees more work during the year, three are in food companies. Perhaps the best known of all is in a meat packing plant. Meat packing, far from being a stable industry, is shown by Department of Labor statistics to have an employee turnover of some 95 percent—more than three times the turnover in American industry generally.

**Stabilized employment offers a sound basis upon which steady, year-round wages can be paid without undermining the financial structure upon which any business must operate. The length of this McCormick payline varies little from month to month.**

### Stabilized Employment

At McCormick & Co., prior to 1932, it was a customary practice to hire and fire employees three times annually. Our industry considered it necessary to operate in this way because of seasonal sales. It was an accepted procedure.

When, in 1932, the company put into effect its multiple-management plan of employee relations, designed to bring the employees into more active participation in company affairs and protect their welfare as a basic duty of management, one of the first actions was to correct this unstable situation. Within the first year, one of the hiring and firing periods had been eliminated. By 1936, the other two had been eliminated. One step at a time, the company stabilized employment of its workers to the extent of assuring at least 48 weeks' pay a year.

### Seven Steps

Here are some of the specific actions that made this possible:

1. We analyzed seasonal sales periods, and through the sales organizations worked with customers so that over the years these seasonal periods were extended to a longer time than before. This was possible at once on some products, difficult or out of the question on others. Every little bit helped toward steadier jobs.

2. We forecast sales ahead far more comprehensively and accurately than we had done in the past. After a few years of experimentation, we found that forecasts and actual sales were remarkably alike. We planned our production in accordance with our forecasts.

3. We set up a floating crew of workers who could be readily shifted from one department to another. The minimum requirements for every department were met by the regular staff of employees in that department. At peak periods of production in a certain department, the floating crew, or a part of it, was sent in so that we did not have to hire people for a short period and then discharge them when the peak period on one product ended. We tried to set up our production schedule so that the floating crew could be shifted immediately to meet the peak in another department.

4. Eventually we found it was possible to work out a flexible transfer of labor between departments in the manufacturing operations, and even in the office, which turned out to be a better solution than the floating crew. Now McCormick hires nonspecialized, unskilled or semiskilled employees to work for the company, not on a specified job. Executives in production and per-

**These girls happened to be filling spice packages when this picture was made. They would be just as much at home in any other of the company's many departments.**

sonnel work together on transferring these people from department to department, in accordance with production peaks, so that all are kept busy. This means special attention to training and good employee spirit, which have been achieved and can be achieved by any company.

5. We improved warehousing facilities to maintain larger stocks, and wherever possible, decentralized warehousing so that goods could be produced to keep employees busy and held in stock either at the headquarters plant or near points of sale.

6. Our Junior and Factory Boards were alert to new production possibilities, and continually conducted marketing research with an eye to having products ready to meet unexpected developments that might cut down the weeks of work a year.

7. Finally, the company management, with the approval of the stockholders, agreed to forego immediate profits in a certain month or quarter, if necessary to keep people on the job, rather than discharge employees to be sure that every month or quarter profits would look good on the record.

We do not contend that a formalized policy is essential. Any company that takes steps in the direction of improved employment stabilization can make a great contribution toward combating the threat of annual wage and toward stabilizing our industry economy.

However, should the company, after experimenting with employment stabilization measures, consider it advisable to formalize its program, it might be done in a statement similar to this one, which summarizes our views on the subject to McCormick employees:

"McCormick & Company, in the spirit of Multiple Management, believes that employees, stockholders, and management should work together in cooperative enterprise in such a way that it becomes management's duty to plan and perform operations to assure employees and stockholders maximum returns.

"In this spirit, we believe employees' security to be a factor of such importance that our policy on employee stabilization should be made known to them.

"We consider it a duty of management to provide permanent employees *an opportunity to work* as many weeks in the year as possible. Our management will take every possible step to assure steady jobs for permanent employees.

"To do this, management needs flexibility—the type of flexibility that will enable it to finance and store inventories for stock when seasonal sales fall off—to train employees to be versatile in several jobs, even to the various maintenance jobs when certain types of products are not needed—to expend additional sales, advertising, and merchandising efforts—to move products in off seasons in order to assist in the leveling of the sales curve —to continue research and experimental work and to supplement as necessary by other means, the present products produced so that the overall demand for the products manufactured by the company will be fairly stabilized instead of fluctuating.

"Our employee stabilization policy is to assure forty-eight weeks of paid work a year, including paid vacation, to all permanent employees of the company—that is, those who have served a six months' employment period with us since their names were first placed on the payroll.

"We do not assure a set minimum wage per week or per year. We do not assure a specific number of hours of work per week. Our intent is that the work week shall be 40 hours with pay at the hourly rates of our standard wage structure, which rates are above those paid for like work in comparable industries in the area. Our intent is to maintain wage rates without reduction and to maintain the work week at a minimum of 40 hours; but, if necessary, to reduce the number of hours worked weekly in preference to reducing the employee's weeks of work before forty-eight in the year. It will be our intent to provide the full fifty-two weeks of paid work in the year if at all possible.

"In addition to base compensation, employees with the company five years or longer receive a deferred income which is really a part of annual earnings. This is possible by contributions paid annually by the company into the McCormick Employee Pension Plan and the McCormick Profit Sharing Trust Agreement, which plans insure employees with normal coverage an income for life after retirement at age 65 of between 40% and 75% of their final compensation, when social security is added to the benefits from the company plans.

"The Company reserves the right to revoke this assurance in the event of catastrophe or an Act of God, which would make its continuance prejudicial to the best interests of all of us working together in Multiple Management — employees, stockholders, and management."

### Want Steady Jobs

After all, what labor wants, whether it calls it annual wage or something else, is an assurance of steadier jobs. Labor organizations will use all their power to get it. The government had indicated it may do something about it. The threat to business is that coercion may force annual wage agreements on terms business cannot meet.

However, if management takes the initiative now to stabilize employment, and shows a comprehension of the problem and a firm intent to take steps toward its solution, much will be accomplished toward convincing labor, government, and the public that the matter is in good hands.

The trend toward annual wage cannot be stopped by management's disregarding it or opposing it outright. It can be stopped by action NOW toward employment stabilization. All of us will benefit. Intelligent compromise can win this postwar battle.

# WHAT TECHNOLOGY MEANS TO THE CANNER*

**PART I—All the way from the seed and the soil to distribution problems, it takes the technologist to insure results. And in explaining how technology serves the canner, the author reveals advanced technics useful to others**

By G. C. SCOTT, Research Director and Production Manager,
Minnesota Valley Canning Co., Le Sueur, Minn.

IN the canning of vegetables, as we know it, a food technologist's work is divided into six general classifications:

1. Raw material production or procurement.
2. Selection or grading of raw material, and procedures for processing it.
3. Setting up of specifications for, and inspection analyses of, supply items and materials used for flavoring or as condiments.
4. Quality control during processing, including the setting up of grade standards for the finished products.
5. Waste disposal and utilization of byproducts.
6. Determination of nutritional and other dietary values of the canned foods.

In carrying on this work, the technologist employs a systematic knowledge both of the arts and of the scientific aspects of the production and processing of canned foods.

### Raw Materials

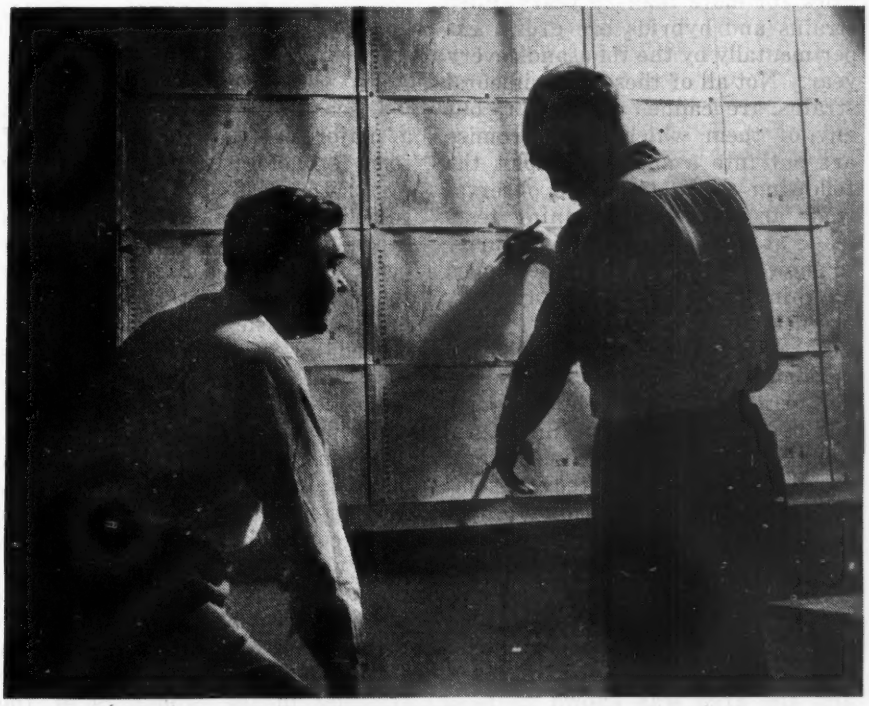
Many vegetable canners grow a considerable tonnage of their raw material. Most of the others contract with farmer growers but actually have to do a major part of the supervision over the growing and harvesting of the crops. For this reason, canning technologists are as much interested in the growing of the crops as in any other phase of canning. There is, therefore, just as great—if not greater—opportunity for research and food technology in connection with raw produce production as there is in any other aspect of the industry.

Processing does little or nothing to improve the quality of the canned product. Our first objective is to obtain the best possible quality of raw produce.

Since all raw produce depends upon soil composition and conditioning, we canning technologists are fundamentally interested in the study of soils. Over a period of years, our companies have accumulated complete surveys of soils in the territories in which we operate. In some areas, we of Minnesota Valley Canning Co. sample every field prior to the planting of that field and make fertilizer recommendations based on the soil analyses. In other areas, we make periodic soil analyses with plant-tissue tests to check the plant's intake of the various nutrient elements to determine whether the plant is actually utilizing the available soil nutrients. Fertilizer recommendations are made to all growers and to all company farms on the basis of these soil and tissue tests. Not only do we specify the composition of fertilizer to be used for an individual crop, but also the rate and the method of application. Experimental trial plots are run annually as a check on the recommendations.

### Weather Forecasting

Weather plays an important, noncontrollable part in the production of any raw produce. We can, however, make use of weather observations and forecasts. Recording thermometers to record both soil



**Charts showing normal and actual daily temperature in the growing area, as well as daily rainfall and temperature-degree hours accumulated since planting time. With this data it is possible to forecast the harvest date.**

*Based on a paper presented at the April, 1945, meeting of the Chicago Section of the Institute of Food Technologists.

and air temperatures, as well as rainfall gages, are installed in strategic spots in our growing areas. We obtain daily telegraphic weather forecasts during the growing season from the U. S. Department of Agriculture weather stations in the areas in which we are producing. By the use of temperature data, we are able to forecast the probable date of the start of the harvest of any crop. We have devised a system to show temperature-hours above a minimum growing temperature for any particular plant. We have determined, for instance, that a pea plant will not grow below a temperature of approximately 40 deg. F. Degree-hours (degrees Fahrenheit above the base temperature times the hours above this temperature) give us quite an accurate index of probable harvest dates and prime maturity.

In one growing area, we have determined, over a period of ten years, that a correlation exists between the amount of rainfall in the mouth of May and the pounds per acre of peas that may be expected during that year. This is possible because there is practically no summer moisture in this area.

### Plant Breeding

Plant breeding and seed selection form a very major part of the program of a canned-food technologist. Our company has been actively engaged in pea- and corn-breeding work for more than 20 years. Pure strains and hybrids are grown experimentally by the thousands every year. Not all of these experimental strains are canned each year, but any of them which show promise are put into a small trial plot the following year. Complete observations are taken and canning tests made at various stages of maturity to show whether we have developed anything better than we presently are using for seed stocks.

In addition to our own seed development, we, of course, try out new strains introduced by seedsmen and by agricultural experiment stations. Because some strains of some crops are better adapted to some territories, determination of the best strain for a particular territory is necessary. A few years ago, we went into a territory where no canning peas had been grown. Peas for the fresh market had been grown there for a number of years, and the area was known to be a good pea-producing territory. But when we introduced our own strains of peas we found that the flavor

**Analyzing corn plant tissues for soil nutrients to determine whether the plant is utilizing the nutrients available.**

and the shape were completely different from those produced in any other location we had encountered. The soil in this area received a top dressing every year from the overflow of a river, giving the soil a different composition every year. We never were able to explain the difference in flavor, nor why the peas should grow to a different shape.

We finally abandoned the plant in that area and moved the machinery to another location. All of this illustrates the fallacy of failing to try out a territory by canning tests of the strains of seed proposed to be used prior to building a cannery there.

### Diseases and Insects

Disease and insect control form a major part of the program of food technologists working on raw produce. Diseases of peas are varied and under certain conditions become so serious that growing peas on certain soils is impossible for years. Some of these diseases are seed-borne and may be prevented by treating the seed. Diseases which are soil-borne, however, are controlled mainly through cultural practices and crop rotation. The control of such insects as pea aphids, which may completely destroy a field of peas overnight, can be accomplished by treating the field with a proper insecticide at the proper time. The decision as to when to treat and what insecticide to use requires the judgment of a skilled entomologist with some training in the economics of the situation. Frequently, a combination of disease and insects makes diagnosis and remedial treatment a serious problem. The corn borer is becoming a serious pest in the production of sweet corn. It is presently traveling at a great rate to the corn-producing areas of Wisconsin and Minnesota, where it was never seen until last year. Control measures are entirely inadequate, and this pest presents a challenge.

### Applied Agronomy

A food technologist should be an agronomist to the extent that he can recommend sound cultural practices to the men engaged in planting and cultivating the crops. New and improved land tillage equipment is constantly being brought out. Studies of crop rotation to determine, for example, what crop grows best before or after another crop—as well as the proper time and depth of planting, the rate of seeding and the spacing of the seed—represent a lot of unknowns today. Pea seed, for example, is very expensive. It costs about $6 per bushel, and about 4 bu. is required to seed one acre. The seed is generally applied through ordinary grain drills. These drills were originally developed to seed inexpensive materials such as oats and wheat, and not much thought was given to how good a distribution job was done. We have been working for a number of years on a better method of seeding peas to give more uniform spacing and thus reduce the cost of seed per acre. In some areas, sowing as little as 2½ bu. per acre seems to be satisfactory. In other areas, it takes up to 5 bu. to do an equivalent job. We don't know why, but we are on the road to finding out.

If a single-commodity cannery is to be operated for the maximum length of time in any one season, planting over a scheduled period is necessary. And it is equally necessary to schedule the harvesting so that the cannery may handle the crop without any of it going to waste and with little idle factory time during the season.

With data derived from previous years and from a knowledge of temperatures and other conditions during the growing period, a technologist should be able to set up the planting schedule and to forecast probable harvest dates so as to utilize plant facilities fully. An average cannery packing only peas will not operate for more than about 400 hours in any one year. A technologist can help to stretch this season by 10 percent, which, in effect, reduces overhead costs by approximately the same amount.

Finally, under the category of raw-produce technology comes the development of grade standards. The U. S. Department of Agriculture has established some grade standards for some commodities. I believe that they generally are used in the case of tomatoes. But the grade standards for sweet corn and peas vary with individual canners. Personally, we feel that the tenderometer is an entirely satisfactory instrument for the grading of raw peas in most areas. And our company has developed a method of measuring raw sweet corn maturity with a refractometer (FOOD INDUSTRIES, September, page 86), which we feel is the most accurate and rapid method so far developed.

**Hand pollenating sweet corn to produce a new hybrid.**

Raw-produce grading is necessary in paying the grower and in segregating classes of raw produce to be handled into the plant. Studies are going on continuously to improve the technics.

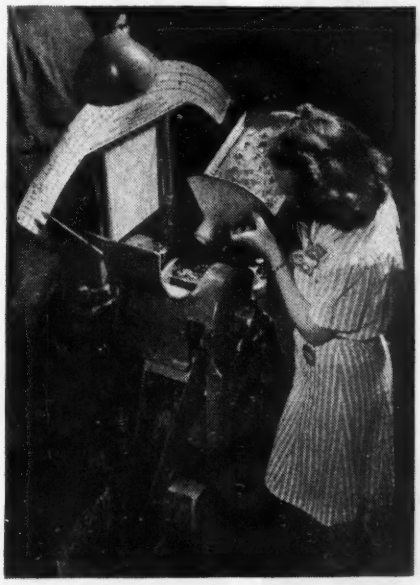
### Processing

The second important division of the canned food technologist's job is concerned with processing. The technologist should prepare detailed recommendations for processing operations. This operations' manual should be revised frequently, at least once a year, and it should be written in language that the cannery foremen can understand. In addition to this work, the technologist, working with the plant designing engineer, should be able to suggest and work out better methods of handling the product within the plant to minimize damage to the raw produce, to retain nutritional value, and to prevent contamination, either bacteriological, enzymatic or metallic. Too frequently, the plant designing engineer is interested primarily in getting the product through the plant and thinks very little about ease of cleaning, wastage of products or elimination of pockets for contamination.

### Need for Improvement

Operations in most canneries start with cleaning and washing. The machines used for these operations are quite common to most canneries. But the manufacturers of most of this equipment lack a fundamental understanding of the proper metals to use and of adequate methods for cleaning the machines quickly and completely. The same comment may be made about equipment used for sorting, peeling, trimming and cutting. Food technologists working with equipment engineers could accomplish much by simplifying the machines to the extent that they become easily demountable and easily cleaned—even continuously cleaned and sterilized. This goes for every piece of cannery equipment—from the dry cleaners to the filling machines. All are sadly in need of being overhauled and redesigned. They should be made of noncorrosive materials and streamlined to the point that they look like food-handling equipment.

Blanching equipment is an outstanding example of bad engineering. The average pea blancher today is perhaps the dirtiest piece of equipment in any food-handling plant. A few years ago, tube and pipe blanchers were tried, but they had some outstanding mechanical defects. It is believed that these defects can be remedied, however.



**Testing the maturity of peas with a tenderometer, an important step in quality control.**

The preparation of brines and sirups present some problems in the elimination of lint and dirt from the outside of the sacks of sugar and salt. There are also problems in storing this material to avoid rodent contamination. Perhaps the canners could learn something from bakers, confectioners and soft-drink manufacturers.

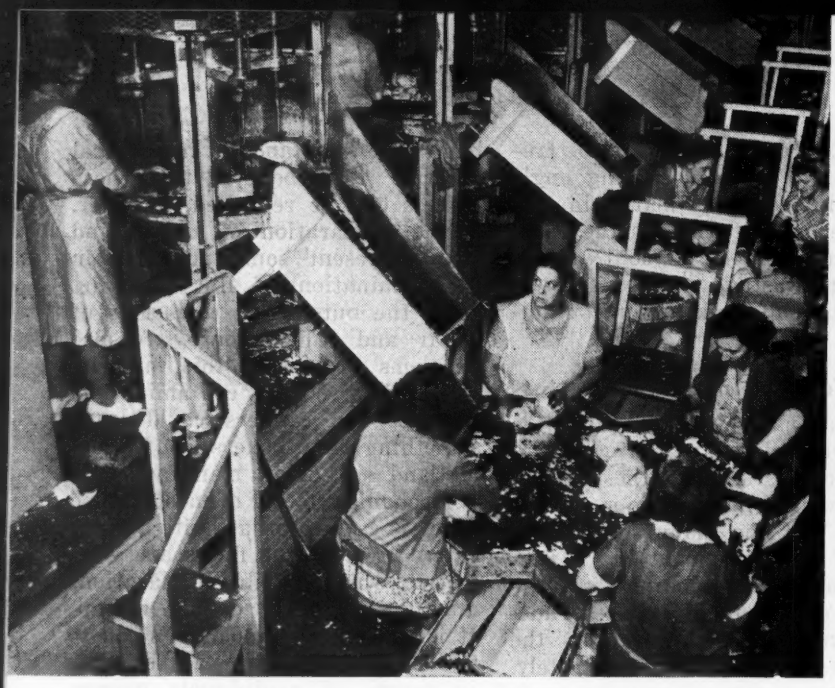
Mechanical filling of most canned foods is carried on at quite a rapid rate. Most of the fillers are volumetric, whereas label declarations must be in terms of net weight. It is the food technologist's job to translate volumetric adjustments in terms of avoirdupois ounces, based on the specific gravity of the commodities being filled. In the case of peas, specific gravity varies with maturity. A responsibility of the technologist is to see that the proper quantity of peas and proper ratio of peas to brine are in each can. Brine and sirup formulas giving the best flavor also come under his jurisdiction.

The canning technologist must be fairly familiar with double-seaming operations in can-closing machines so that he can diagnose troubles caused by loose or improperly formed seams. And he should see that the proper procedures are set up to insure adequate exhausting or vacuumizing. Cans should be coded in the can-closing machine, and it is part of the technologist's duties to make up a code sheet.

Processing, as it is commonly known in the canning industry, consists of heat-treating the filled and closed containers for a time and at a temperature sufficient to destroy all pathogenic bacteria. It is certainly the food technologist's responsibility to see that each batch of cans is processed sufficiently to accomplish this purpose.

Cooling of canned foods is just as important as processing. The development of thermophilic anaerobes, as well as conditions known as "stack burning," can only be prevented through the proper control of the cooling procedure. Control of cooling-water contamination is also an important part of the technologist's job, because contaminated cooling water has been shown definitely to have a very direct bearing upon the amount of spoilage in a pack of canned foods.

*Part II of this article will appear in November.—The Editors.*



1. Cabbage heads come into the plant on a belt conveyor. Hard cabbage cores are shredded in coring machines (left), then transferred by wooden chutes to the trimmers. The cabbages then go by belt conveyor to the cutters.

2. The kraut cutter operates by pressing the cabbage heads down onto scroll-shaped revolving blades. The machines shred up to 50 tons of cabbage a day.

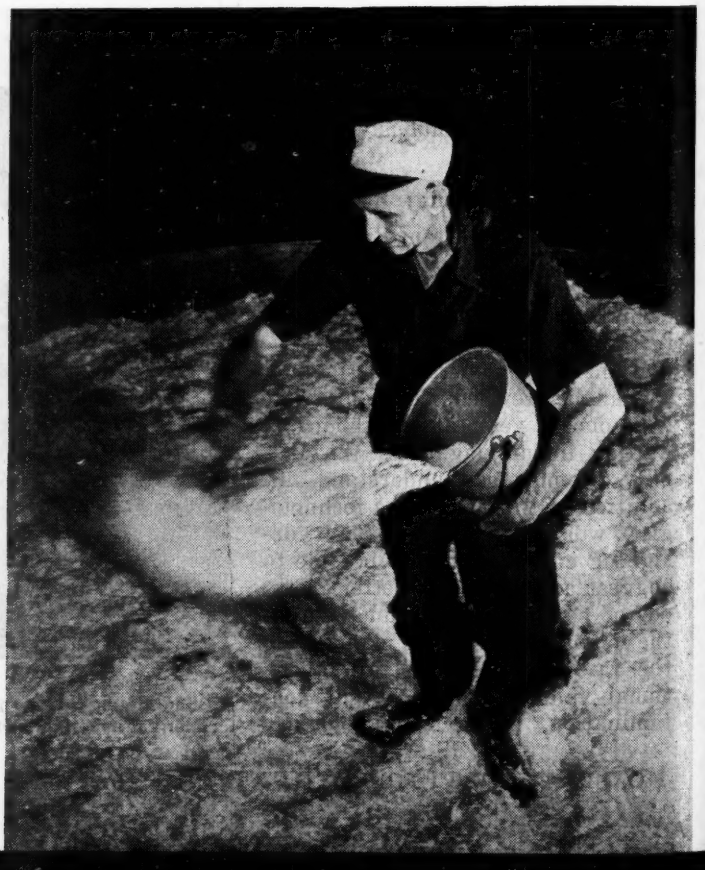
# Making and Canning Sauerkraut

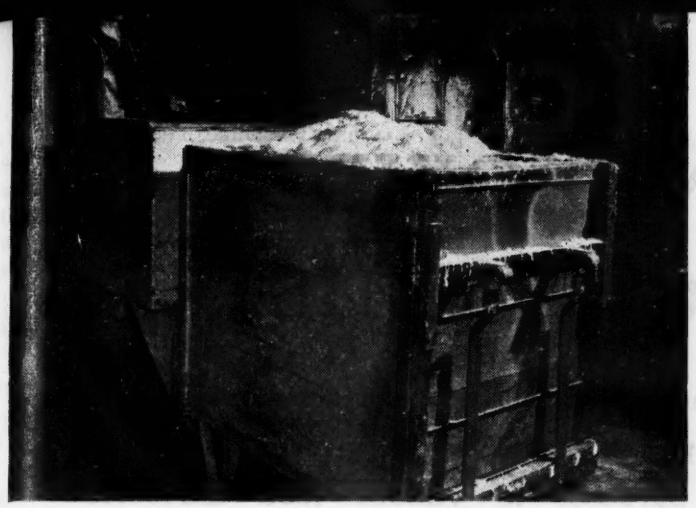
**Important steps in the operations of manufacturing canned sauerkraut from coring the cabbages to cooling the heat-processed cans. These pictures were taken in the plant of Empire State Pickling Co., Phelps, N. Y.**

U. S. D. A. Photos by Osborne

3. Cut cabbage is hand trucked and dumped into fermentation vats and spread in even layers. Worker's rubber boots are washed before entry into the vats.

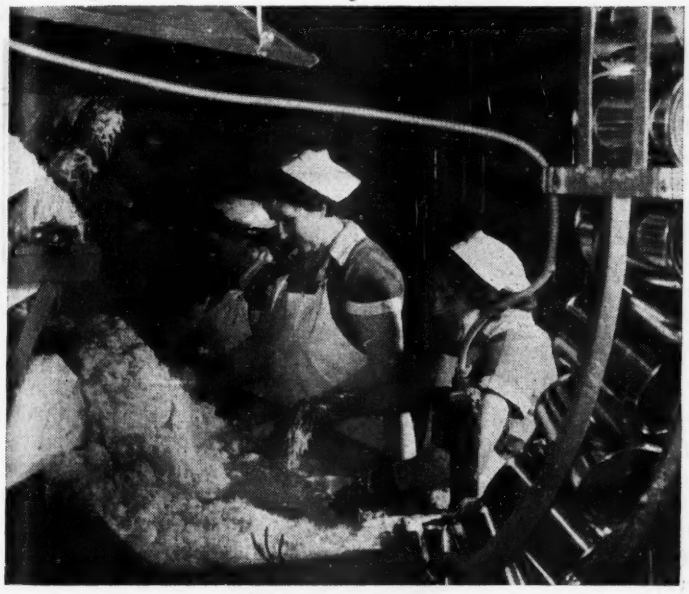
4. Salt is sprinkled uniformly over each layer of shredded cabbage as it is spread out. After several weeks the fermentation and cure is complete.



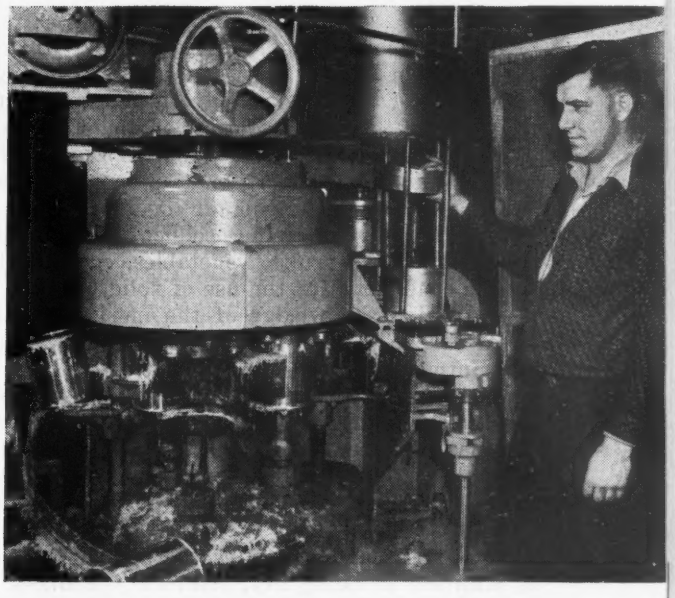


5. After the cure, sauerkraut is forked from the fermentation vats and loaded into box to be conveyed by power truck to heating tank.

6. Closeup of batch preheating and mixing operation through which the cured kraut passes before being filled into the cans.

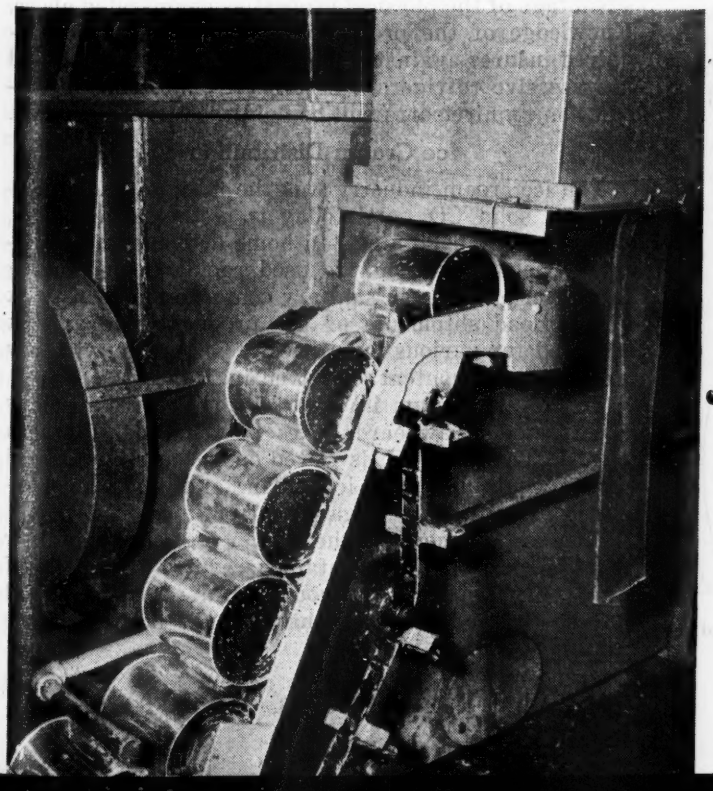


7. Packing the preheated kraut into cans on a conveyor. Hand packing is still the best method of filling.

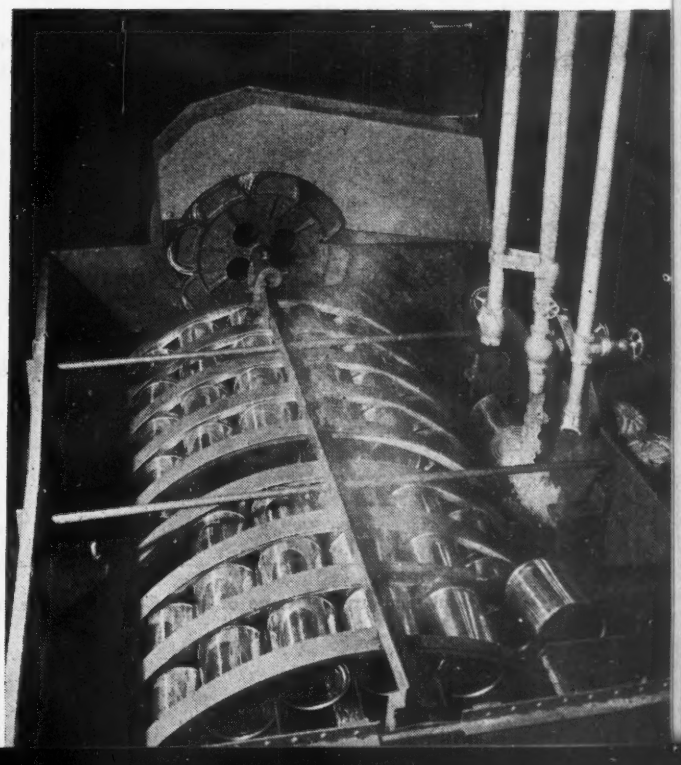


8. Filled cans are closed by an automatic double seamer. Use of the preheater makes an exhaust box unnecessary.

9. From the closing machine, the cans of sauerkraut are conveyed into an open-type cooker to be sterilized.



10. After processing in boiling water, the cans are moved automatically through this open-type water cooler. The next steps are drying, labeling and packing in cartons for shipment.



# CARBON DIOXIDE IN THE FOOD INDUSTRY

**PART III—Uses of Solid $CO_2$—The author tells how carbon dioxide ice is used to advantage in shipping perishables. And he gives data on the amount required for specific purposes in various food industries**

By GUSTAVE T. REICH, Consulting Engineer, Philadelphia, Pa.

VARIOUS factors should be considered when solid $CO_2$ is to be used as a refrigerant in shipping perishables. Time in transit, temperature and humidity required, and the concentration of the $CO_2$ gas liberated must be borne in mind. Whether the perishables are for highway transport or cross-country hauling by railroad also is an important consideration.

Depending on whether the product to be transported is meat, fish, fowl, fruits, vegetables, eggs, butter or milk, the conditions for the use of solid $CO_2$ will vary. And insufficient knowledge of the merits and limitations of carbon dioxide ice quite frequently results in disappointment with the refrigerant.

The physical properties of solid $CO_2$ are given in Table I. Its refrigerating effect is 275 B.t.u. per pound, while that of water ice is 155 B.t.u. One pound of it is equivalent to 2½ to 3 lb. of water ice and salt mixture. Another important property of solid $CO_2$ is that it changes from a solid to a gas (sublimes), while water ice melts and saturates the air with moisture.

In addition to being dry, solid $CO_2$ produces lower temperatures than water ice, and the gaseous $CO_2$ is a better insulant than air. Other advantages are its ease of handling, longer refrigeration effect without reicing, ability to maintain an even temperature by means of thermoregulators and blowers, and the fact that it permits more payload per container unit. All these factors must be weighed against the higher per pound cost of solid $CO_2$.

When using solid $CO_2$ as a transport refrigerant, the construction of the shipping containers must take advantage of the physical properties enumerated above. Knowledge of the proper thickness of insulation required insures against spoilage of food product as well as excessive refrigerant costs. (A chart showing insulation requirements will be published with Part IV).

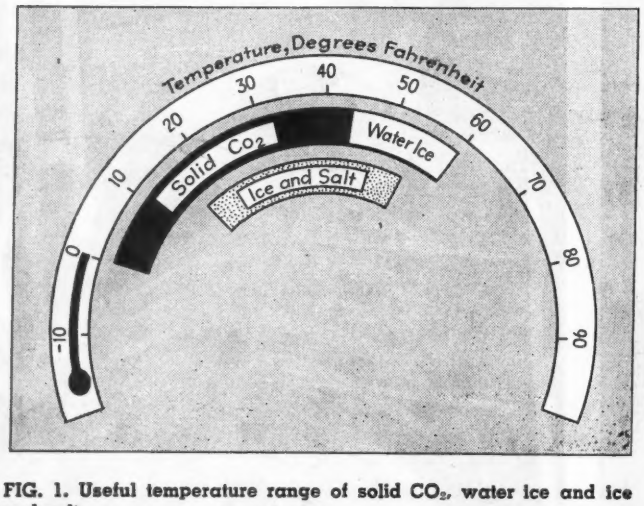



FIG. 1. Useful temperature range of solid $CO_2$, water ice and ice and salt.

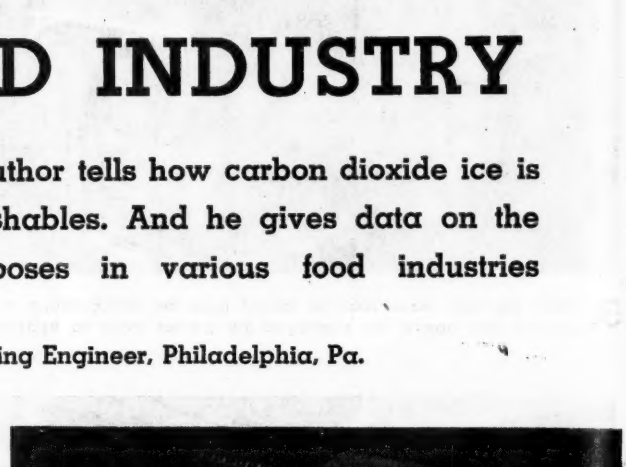


FIG. 2. Double corrugated container for fancy ice cream under solid $CO_2$ refrigeration.

### Ice Cream Distribution

The ice cream industry was the first to take advantage of solid $CO_2$, and today it is the largest user. From a small beginning—in home delivery and carry-away packages—it now is used regularly in vending ice cream products in sanitary containers and in truck and carload shipments of the product. The amount required for various quantities of ice cream with low fat and sugar content are given in Table II.

To ship ice cream in fancy form requires specially constructed strawboard boxes of the type shown in Fig. 2. The solid $CO_2$ is placed on top of a corrugated carton containing the ice cream and the whole enclosed in a larger corrugated carton.

Express shipments in the prewar 5-gal. tin container and the present fiber container require 7 to 9 lb. of solid $CO_2$ for 16 to 20 hours. Half of it is placed on the top and the other half on the bottom of the container.

One large ice cream manufacturer, who ships his products thousands of miles and who shipped to the Caribbean Islands before the war, found that the amounts of solid $CO_2$ required were as follows:

| Time in travel (hours).. | 18 | 48 | 72 | 96 |
|---|---|---|---|---|
| Amount of ice cream (qt.) | 20 | 20 | 20 | 20 |
| Amount of solid $CO_2$ (lb.) | 6 | 12 | 18 | 25 |

Newly constructed ice cream cabinets for bulk or package goods require approximately 3 lb. of solid $CO_2$ per hole per day.

There are several types of ice cream truck designs using solid $CO_2$ in a conduction refrigerating system. Their load capacity varies from 300 to over 2,000 gal. The requirements in summer for a 300-gal. truck are 60 lb. of solid $CO_2$ per 24 hours, while a 500-gal. truck takes 90 lb. and a 750-gal. unit requires 120 lb. In winter, approximately 40 percent less of the refrigerant is consumed. As to the number of ice cream trucks using $CO_2$ ice as a refrigerant, a study by International Association of Ice Cream Manufacturers in 1938 showed that 35.3 percent of 2,245 vehicles were so refrigerated.

In 1941, the Bettar Ice Cream Co., Baltimore, received an order from the Army for a shipment of 6,400,000 portions of ice cream for regiments maneuvering in North Carolina. In shipping the order by refrigerator car, the main problem was to make sure that the temperature in the car would be 6 deg. F. Solid $CO_2$ was used and a regulation ice bunker was filled with a 30 percent brine and ice mixture, to retard the sublimation of the $CO_2$ ice.

## Transporting Meat

When considering the shipment of meat, these questions arise: (1) Has $CO_2$ any retarding influence upon the meat spoilage? (2) Will it increase the shrinkage of the meat?

W. L. Mallmann and coworkers[9] reported that a 2.5 percent $CO_2$ atmosphere in refrigerators maintained at 38.3 to 41 deg. F. retarded meat spoilage bacteria. A 10 percent $CO_2$ atmosphere in refrigerators kept at 38.3 to 41 deg. F. reduced the number of meat spoilage bacteria, and at 64.4 to 68 deg. F. there was no significant effect upon staphylococci and paratyphoid organisms.

After many years of shipping meat under $CO_2$ refrigeration, the consensus among packers is that the meat does not shrink, nor does the $CO_2$ affect its color or bloom. Shipments of meat refrigerated with solid $CO_2$ are made in boxes, cases and barrels, by truck, railroad and ocean liner.

Fig. 3. Vertical solid $CO_2$ bunker in refrigerator car hauling meat.

TABLE I—Physical Properties of Solid $CO_2$ and Water Ice.

| | Solid $CO_2$ | Water Ice |
|---|---|---|
| Specific gravity | 1.53 | 0.99987 |
| Melting or sublimation point | —109.6° F. | 32° F. |
| Boiling point | ..... | 212° F. |
| Critical temperature | 88.43° F. | 689° F. |
| Critical pressure, abs. | 1,071 lb. per sq. in. | 2,860.6 lb. per sq. in. |
| Latent heat of fusion | 82.0 B.t.u. | 144 B.t.u. |
| Latent heat of vaporization | 158.6 B.t.u. | 1,074.29 B.t.u. |
| Weight per cu. ft. at 32° F. (gas) | 0.117 lb. | 0.000340 lb. |
| Weight per cu. ft. of solid | 90 lb. | 57 lb. |
| Latent heat of sublimation | 240.6 B.t.u. | ..... |
| Refrigerating effect per lb. | 275 B.t.u. | 155 B.t.u. |

Experience shows that a 200-lb. meat barrel lined with an Arkel bag or its equivalent, holding 180 lb. of meat, can be refrigerated with 15 lb. of solid $CO_2$ for 48 hours when the outside temperature is 90 deg. F. About 6 lb. of solid $CO_2$ is placed on the bottom of the barrel, while 9 lb. wrapped in four thicknesses of paper is put on top of the meat.

Trucks hauling meat can be refrigerated by placing the solid $CO_2$ into bags which are hung from the truck ceiling, by putting it into a wire-mesh bunker or by placing it on top of the meat. All of these simple methods are quite efficient and are especially useful in speed-up shipments. The cost of the solid $CO_2$, owing to its rapid sublimation, is somewhat high, but the results obtained undoubtedly justify such means. This is especially so in view of the fact that almost no payload space is taken up by the refrigerant.

TABLE II—Amount of Solid $CO_2$ Required for Ice Cream.

| Size | Solid $CO_2$ | Hours |
|---|---|---|
| 1 pint | ½ lb. | 8 |
| 1 quart | ¾ lb. | 8 |
| 2 quarts | 1¼ lb. | 8 |
| 4 quarts | 4 lb. | 16 |
| 8 quarts | 6 lb. | 16 |
| 20 quarts | 8 lb. | 16 |
| 5-gal. bulk | 8 lb. | 16 |

Depending on the distances to be covered, well-insulated trucks may or may not be equipped with circulating fans. For short hauls of not over 24 hours, the shippers prefer fan-type bunkers. Performance data have been recorded for a 22-ft. trailer equipped with two blower-type, 18-gage, galvanized-iron bunkers suspended from the ceiling. The load, which was precooled, consisted of 20 bbl. of beef, 31 bbl. of pork, bellies, hams and sausage, representing a total of 21,173 lb. The temperatures of the meat remained almost constant over a period of 10 hours (Table III). The bunker fans were turned on for the first three hours and the last three hours of the trip.

A 20-ft. trailer containing a precooled load requires for adequate refrigeration 200 lb. of solid $CO_2$ for an 18-hour run and 400 lb. for 36 hours.

Refrigerator cars used in the meat industry require fewer reicings when supplemented (boosted) with solid $CO_2$, and the general opinion is that in the presence of this refrigerant there is less loss of bloom. Table IV shows the effect of $CO_2$ on the bacteria count in refrigerator cars in transit.

**TABLE III—Performance Data for Hauling Meat.**

| | Center air | Center product | Outside temp. |
|---|---|---|---|
| Chicago 3:00 PM 9/8 (before dry ice) | 78° F. | ..... | 82° F. |
| Chicago 7:00 PM 9/8 (doors closed) | 48° F. | 36° F. | 74° F. |
| Chicago 10:45 PM 9/8 | 40° F. | 36° F. | 72° F. |
| Chicago 3:00 AM 9/9 | 38° F. | 36° F. | 70° F. |
| Ft. Wayne 5:10 AM 9/9 | 38° F. | 35° F. | 66° F. |

**TABLE IV—Carbon Dioxide Effect on Bacteria Count in Refrigerator Cars During Transit**

Shipper: ..... Waterloo, Iowa
Equipment: ..... 11-ft. horizontal solid $CO_2$ bunkers
Consignee: ..... Miami, Fla.
Load: Assorted packing house products

Icing Record

| Date | Time | Water Ice | Salt | Solid $CO_2$ |
|---|---|---|---|---|
| 1/12/40 | 7 a.m. | 7,200 lb. | None | 500 lb. |

No transit icing

1/17/40—1 a.m.—Water-ice bunkers, ⅝th full. Solid $CO_2$ bunker in "A" end empty. Solid $CO_2$ bunker in "B" end about 30 lb.

Temperature and $CO_2$ Concentration Record

| Date | Time | $CO_2$ top of load (percent) | $CO_2$ at floor (percent) | Temp. at top of load (deg. F.) | Outside temp. (deg. F.) |
|---|---|---|---|---|---|
| 1/13/40 | C.S.T. 4:10 a.m. | 4.0 | 5.5 | 31 | 34 |
| 1/13/40 | C.S.T. 3:55 p.m. | 4.5 | 6.0 | 30 | 38 |
| 1/14/40 | C.S.T. 6:10 a.m. | 6.0 | 7.0 | 30 | 39 |
| 1/14/40 | C.S.T. 8:35 p.m. | 8.0 | 9.0 | 28 | 39 |
| 1/15/40 | C.S.T. 6:35 a.m. | 8.0 | 9.5 | 30 | 36 |
| 1/15/40 | E.S.T. 6:10 p.m. | 7.5 | 9.0 | 33 | 46 |
| 1/16/40 | E.S.T. 2:50 a.m. | 4.5 | 6.0 | 33 | 42 |

Report of bacteria count on specimens from this car:

| Specimen | Count in 24 hours | Count in 48 hours |
|---|---|---|
| 1 CC | 3 colonies | 19 colonies |
| 5 CC | 4 colonies | 14 colonies |

No evidence of fungi growth on plates. (Plates held for 2 days at room temperature.)

## Shipping Poultry

Shipment of poultry in boxes and barrels is quite extensive. Normal practice is to take a barrel, line the bottom with excelsior, insert one or two Arkel bags and pack the poultry into the bag-lined barrel. Then the solid $CO_2$ (wrapped in four thicknesses of paper) is inserted, the Arkel bag is sealed at the top and excelsior is put over it. The barrel is now covered either with Sisalkraft paper or burlap, held down by a hoop. As the Arkel bag is made of waxed brown paper, it will retain a high concentration of $CO_2$. Experiments show that, in summer, 8 to 10 lb. of solid $CO_2$ is required for overnight and 12 to 15 lb. for 24 hours. Some packers have developed very neat packing boxes for the shipment of turkeys, as shown in Fig. 4.

When fresh poultry is to be refrigerated to carlot shipments, the best results are obtained with a combination of water ice without salt and solid $CO_2$. During transit, poultry may develop a slimy condition under the wings and beneath the legs. It has been found that the above combination of refrigerants has a beneficial effect.

The usual procedure in shipping poultry is to fill the car bunkers two-thirds full of water ice, close the doors, place on top of the water ice 100 to 120 lb. of solid $CO_2$ for each day the car is in transit, and finally fill the bunkers to the top with water ice. In this manner, refrigerated cars can be kept in transit for almost a week without further icing. Frozen poultry can be refrigerated either with water ice and solid $CO_2$ or solid $CO_2$ alone. Depending upon the place of destination and the month in which shipment is made, from 500 to 1,200 lb. of solid $CO_2$ is required per car.

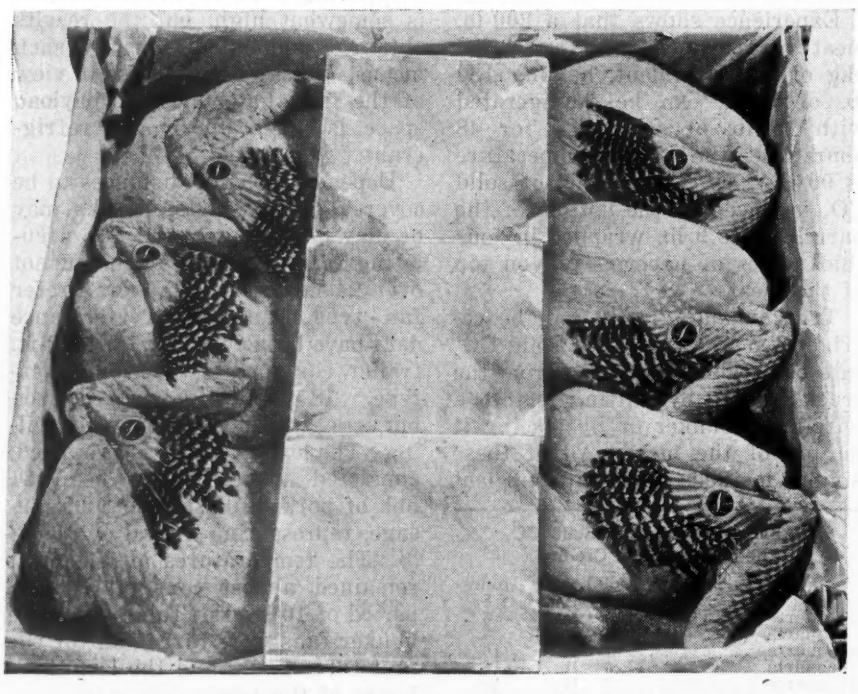


FIG. 4. Box containing 130 lb. of turkeys is refrigerated with three 5-lb. pieces of solid $CO_2$.

## Shipping Eggs

Lescarde-Everaert[11] have shown that a $CO_2$ atmosphere helps to keep eggs fresh in storage. For the shipment of fresh shell eggs, care must be taken not to cool the rail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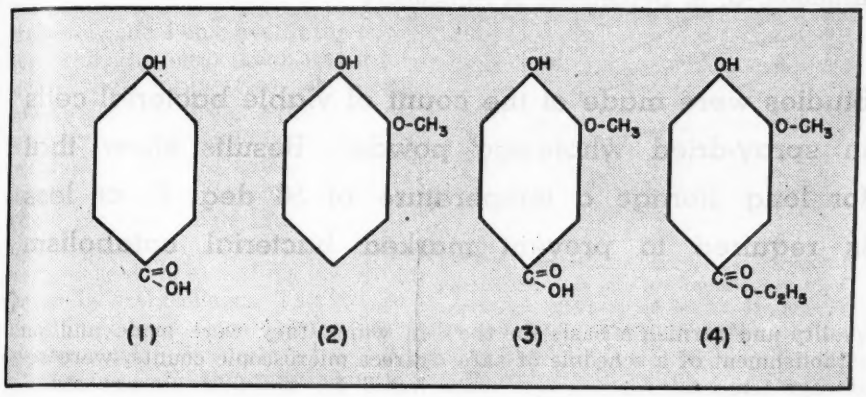
car or trucks to too low a temperature. The combination of water ice and solid $CO_2$ is quite effective for cars, provided solid $CO_2$ is not used in such large quantities as with poultry shipments. Approximately 200 to 300 lb. of solid $CO_2$ can be employed per car. Truck shipments require proportionally less. Owing to the fuller lading of the trucks, solid $CO_2$ should be placed 14 to 15 in. over the lading and preferably supported on a poor conductor such as corkboard.




**(1) Parahydroxybenzoic acid. Its esters inhibit the yeast fermentation of glucose. (2) Guaiacol. This has generally recognized therapeutic properties. (3) Vanillic acid. Its alkyl esters have a preservative action for sugars. (4) Ethyl vanillate. Tests on laboratory animals indicate a low toxicity.**

# Vanillic Acid Esters As Preservatives

By IRWIN A. PEARL,
The Institute of Paper Chemistry, Appleton, Wis.

**Tests indicate that they are very potent agents against certain microorganisms, particularly molds and heat-resistant, spore-forming bacteria. They are nontoxic**

DURING the past several years there has been an acute need for nontoxic preservatives to be used in perishable foodstuffs shipped or stored without benefit of refrigeration. At present, sodium benzoate is the only preservative used for this purpose, but it has failed to solve many of the important food preserving problems.

When The Institute of Paper Chemistry recently developed a simple process for the quantitative transformation of vanillin to vanillic acid, the esters of vanillic acid were investigated for their food preserving properties, with promising results.* Heretofore, there has been no satisfactory method for the production of vanillic acid.

There were several reasons why preservative properties could be expected. Vanillic acid is a derivative of p-hydroxybenzoic acid and esters of the latter have received considerable attention as preservatives.[1] Further, vanillic acid contains the guaiacyl radical, which is known to have inherent therapeutic properties. The structural diagrams above show these relationships.

Then, too, some years ago, in the course of an investigation of the antimicrobic properties of hydroxy- and alkoxybenzoic acids and esters, Sabalitschka and Tietz[2] found that several esters of vanillic acid were good inhibitors of the yeast fermentation of glucose.

*This work was carried on for the Sulphite Pulp Manufacturers' Committee on Waste Disposal, and this preliminary note is published with their permission.

## Effectiveness

Laboratory studies by John F. McCoy, of the staff of the Institute, have indicated that the alkyl esters of vanillic acid are very potent agents against selected test microorganisms. In general, the antimicrobial efficiency increases with increasing molecular weight up to the butyl ester, and then decreases. In addition, the studies indicated that these compounds were especially effective against heat-resistant spore-forming bacteria and against molds.

The esters of vanillic acid were prepared from a solution of the acid in the desired anhydrous alcohol, either by saturating the solution with dry hydrogen chloride or by adding sulphuric acid and boiling for a short time under reflux. The esters were purified by distillation under reduced pressure. The products were colorless, very viscous oils, most of which, on standing, crystallized to low-melting solids, substantially odorless and tasteless.

Actual food preservation studies now in progress demonstrate the efficiency of vanillic acid esters in preserving such foods as salt fish, fresh fruit juices, vegetable juices, cheese spreads and bread.

## Nontoxicity Indicated

Toxicity studies on ethyl vanillate, using rabbits, guinea pigs and rats, are in progress at the Kettering Laboratory of Applied Physiology of the University of Cincinnati. The work thus far indicates that when administered in olive oil to rabbits or rats, ethyl vanillate and sodium benzoate have approximately the same lethal dose; when administered in aqueous suspension, the vanillate is much less toxic than the benzoate.

Where it can be demonstrated that ethyl vanillate will make possible the delivery of acceptable food products to the armed forces, its use in amounts up to 0.1 percent will be accepted by the officials of the Federal Food and Drug Administration.

## Method to Be Published

The details of the preparation and properties of the new esters, with the results of antimicrobic evaluation, toxicity studies and food preservation studies, will appear in future papers.

### References

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# Effect of Storage Temperature On Bacteria in Egg Powder

By L. S. STUART*, HARRY E. GORESLINE*, HELEN S. SMART* and VIRGINIA T. DAWSON**
Agricultural Research Administration, U. S. Department of Agriculture†

**Studies were made of the count of viable bacterial cells in spray-dried whole-egg powder. Results show that for long storage a temperature of 50 deg. F. or less is required to prevent marked bacterial catabolism**

DEBORD[1] observed that death of bacteria occurred during storage of spray-dried whole-egg powder and was more rapid, at the temperatures studied, in powder made from inferior grades of eggs. In powders made from all grades of shell eggs, death was much more rapid at 37 deg. C. than at 20 deg. C. These findings are in line with observations made on the death of bacterial cells in other dried materials. It has been demonstrated many times that the death of bacterial cells (either vegetative cells or spores) in dried materials is the result of normal catabolic processes and proceeds at a fairly uniform logarithmic rate.[2]

Since catabolism is accelerated by increasing temperatures and proceeds otherwise in the same manner as chemical reactions,[2,3] it might reasonably be expected that the logarithmic rate of bacterial cell death in stored spray-dried whole-egg powder would parallel the rate of chemical change in the powder itself. Unfortunately, DeBord[1] did not publish data extensive enough for analysis on a logarithmic death-curve basis. A preliminary study by Stuart, Hall, and Dicks[4] showed that the bacterial cell death rate in stored spray-dried whole-egg powder was markedly affected by the amount of moisture present. Therefore, a study of the logarithmic rate of bacterial cell death in egg powders, of the same or nearly the same moisture content and stored under different temperature conditions, would provide direct evidence as to the effect of storage temperature on the rate of the catalobic processes.

The data obtained might well serve as a key in determining the effect of storage temperature on quality and furnish a basis for the establishment of a schedule of safe storage temperatures.

### Procedure and Results

All batches used in these studies were freshly dried on commercial dryers and shipped to the laboratory without prior storage. No special cooling device was employed, as the batch samples were collected directly from the dryers. A report detailing the type of dryer used and the general sanitary features of the breaking and drying procedures employed at the time of sampling accompanied each batch. Small subsamples of each batch of powder received were stored in screw-capped glass bottles, sealed with paraffine after closure, at temperatures ranging from 0 to 110 deg. F. (–17.8 to 43.3 deg. C.). Viable bacterial cell (plate) counts were made at regularly spaced intervals during each storage study. The technics employed in making the total viable and direct microscopic counts reported were the same as those outlined for dried eggs by the American Public Health Association.[5]

Seven batches of powder of different sanitary quality, as judged by inspection reports on the plants in which they were made and on direct microscopic counts, were selected for the first storage study. All seven were produced in Douthitt dryers; thus any effect of mechanical differences in drying operations was largely eliminated. Samples from all seven batches were stored at 86 deg. F. (30 deg. C.) for 46 days, and all samples had a moisture content of $4.64 \pm 0.21$ percent when sealed in the storage bottles. Dilution plate counts were made at the beginning of storage and after 4, 8, 12, 16, 32 and 46 days. The results are given in Table I.

In Fig. 1, the logarithmic death-rate curves for the seven samples studied are given. These were plotted from the decreases in count of viable cells, $\log C_i - \log C_t$, where $C_i$ is the initial viable cell count and $C_t$ is the viable cell count after a specified time, as shown by Table I. From Table I and Fig. 1, it appears that the rate of bacterial death in the relatively low-count powders (samples 1, 2, 3 and 4) can be illustrated by uniform curves. Thus, death can be ascribed to normal catabolic processes in these samples. The death-rate curves for the powders with high initial viable-cell counts and high

**TABLE I—Bacterial Cell Counts on Dried Egg Powders of Different Sanitary Quality After Storage at 86 Deg. F. (30 Deg. C.) for Different Periods.**

| Sample No. | Direct microscopic count (incl. dead cells) per gram | Plate count (viable cells per gram) after different storage periods: At start (initial count) per gram | 4 days per gram | 8 days per gram | 12 days per gram | 16 days per gram | 32 days per gram | 46 days per gram |
|---|---|---|---|---|---|---|---|---|
| 1 | 440 000 | 10,700 | 6,500 | 3,400 | 3,000 | 2,100 | 1,100 | 800 |
| 2 | 4,300,000 | 50,000 | 39,000 | 21,500 | 25,500 | 8,600 | 5,000 | 3,400 |
| 3 | 4,800,000 | 34,000 | 31,000 | 24,400 | 21,000 | 20,000 | 19,000 | 17,600 |
| 4 | 16,700,000 | 165,000 | 118,000 | 84,000 | 37,000 | 20,000 | 9,000 | 4,000 |
| 5 | 22,500,000 | 400,000 | 300,000 | 210,000 | 201,000 | 65,000 | 41,000 | 13,900 |
| 6 | 50,000,000 | 1,050,000 | 520,000 | 150,000 | 53,000 | 24,000 | 11,000 | 2,800 |
| 7 | 85,500,000 | 21,200,000 | 14,700,000 | 9,000,000 | 7,500,000 | 7,100,000 | 6,300,000 | 2,000,000 |

*Transferred to the War Food Administration.
**Transferred to the Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration.
†Agricultural Chemical Research Division, Bureau of Agricultural and Industrial Chemistry.

initial direct microscopic counts of viable and dead cells (samples 5, 6 and 7) are not uniform. These samples were produced in plants having a low sanitation rating. Distinct sigmoid characteristics are shown by the curves for all three samples, indicating that a factor other than those involved in normal catabolic processes contributed to cell death. If this factor also accelerates chemical changes in the powder itself, the observation would indicate that spray-dried whole-egg powders made from eggs of low sanitary quality would be more susceptible to changes caused by secondary chemical reactions than would powders made from eggs of high sanitary quality. It would seem reasonable to assume that this factor is extracellular. This would identify it as a constituent of the powder itself.

This preliminary study showed clearly that to determine the effect of storage temperature or other storage factors on the logarithmic rate of bacterial death, spray-dried egg powders of the same or nearly the same initial sanitary quality must be used.

To determine the effect of temperature on the rate of bacterial cell death in spray-dried egg powder of high sanitary quality, five batches were chosen that had viable-cell counts of less than 100,000 per gram immediately after drying. The average viable-cell count for all five batches was 31,000 per gram, and the direct microscopic counts, including dead cells, ranged from 1,000,000 to 5,000,000 cells per gram. The inspection reports on the plants in which they were made indicated that they were produced under sanitary conditions better than average. Samples from all five batches were stored in sealed containers at 0, 45, 75, 86, 98 and 110 deg. F. for 24 weeks, and counts were made at the start and after 1, 2, 4, 8, 12 and 24 weeks of storage. The moisture contents of the batches were within the range of $4.34 \pm 0.17$ percent. The logarithmic death-rate curves at the different storage temperatures, computed from the average counts for the samples, are given in Fig. 2. This figure shows that the death rate of bacterial cells increased as the temperature of storage was increased from 0 to 110 deg. F. Some cell death occurred even at 0 deg., but at 98 and 110 deg. the primary rate of death was rapid. After 12 weeks of storage, a secondary accel-

(*Turn to page* 192)

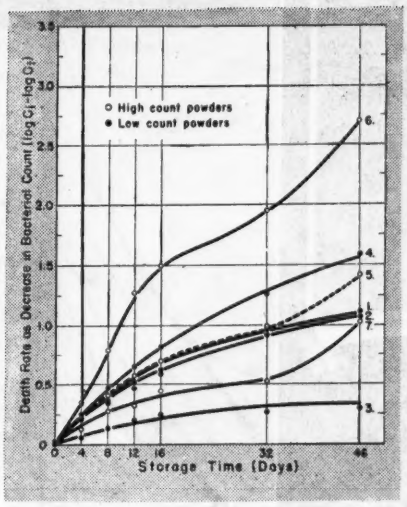



**FIG. 1. Logarithmic death-rate curves of bacteria in high- and low-count spray-dried whole-egg powders stored at 86 deg. F. (30 deg. C.) for different periods.**

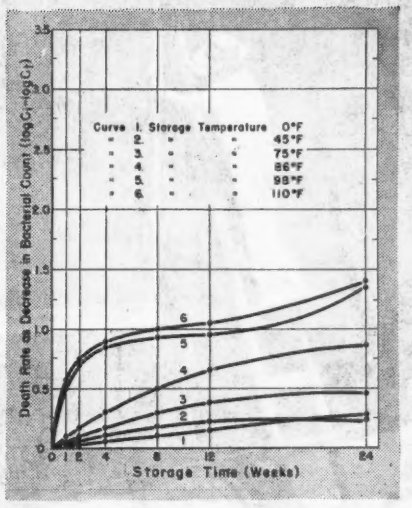

Curve 1. Storage Temperature 0°F
2. " " 45°F
3. " " 75°F
4. " " 86°F
5. " " 98°F
6. " " 110°F
Death Rate as Decrease in Bacterial Count (log C₁-log C₂)
Storage Time (Weeks)

**FIG. 2. Logarithmic death-rate curves of bacteria in spray-dried whole-egg powder of high sanitary quality stored at different temperatures for different periods.**

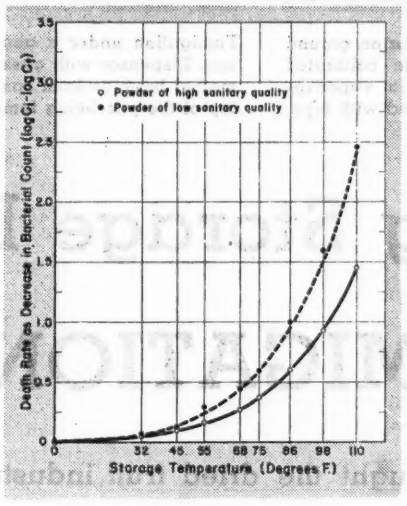

○ Powder of high sanitary quality
● Powder of low sanitary quality
Death Rate as Decrease in Bacterial Count (log C₁-log C₂)
Storage Temperature (Degrees F.)

**FIG. 3. Effect of storage temperature on death rate of bacteria in egg powders of high and low sanitary quality after 12 weeks' storage.**

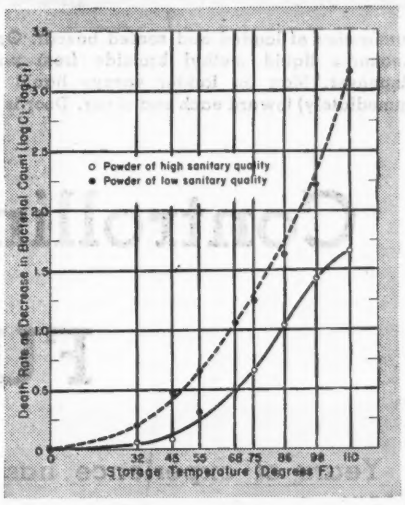

○ Powder of high sanitary quality
● Powder of low sanitary quality
Death Rate as Decrease in Bacterial Count (log C₁-log C₂)
Storage Temperature (Degrees F.)

**FIG. 4. Effect of storage temperature on death rate of bacteria in egg powders of high and low sanitary quality after 24 weeks' storage.**

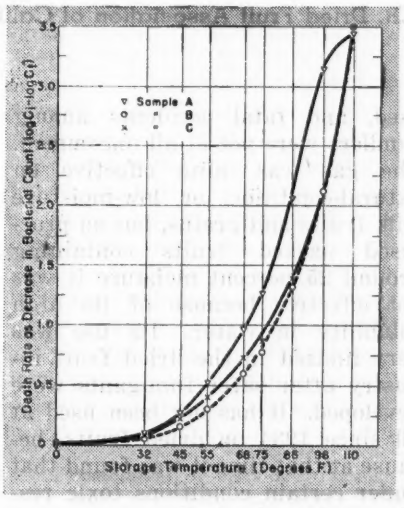



**FIG. 5. Effect of storage temperature on death-rate of bacteria in egg powders of average sanitary quality after 48 weeks' storage.**

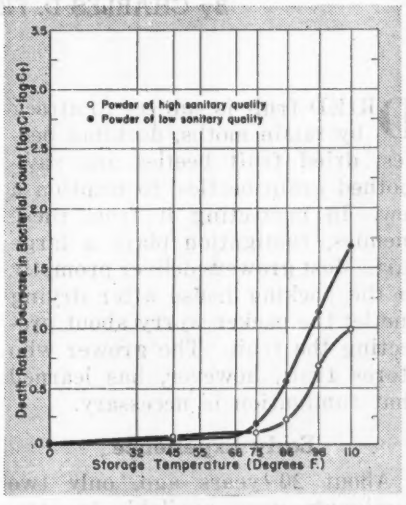
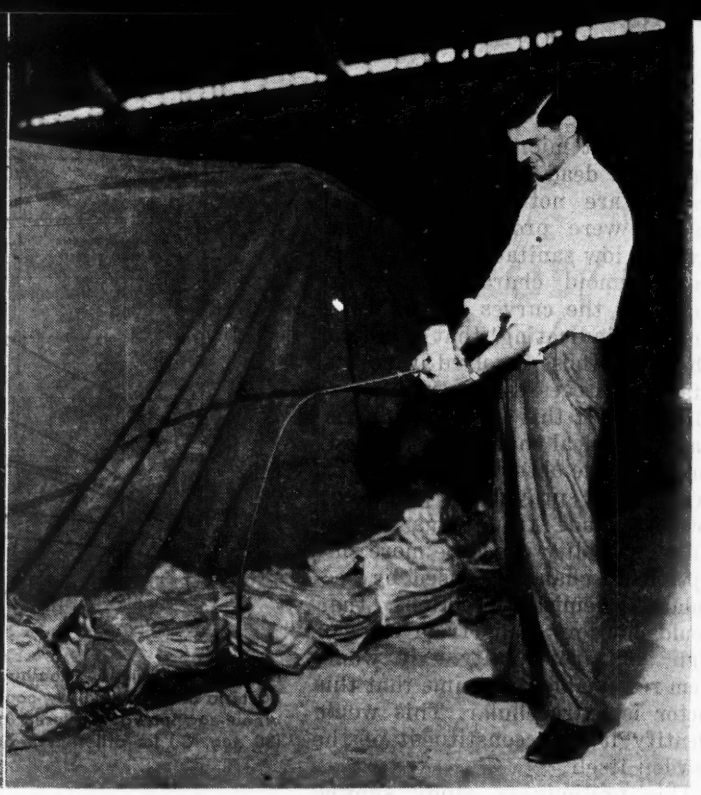

○ Powder of high sanitary quality
● Powder of low sanitary quality
Death Rate as Decrease in Bacterial Count (log C₁-log C₂)
Storage Temperature (Degrees F.)

**FIG. 6. Effect of storage temperature on death rate of bacteria in egg powders of high and low sanitary quality after 2 weeks' storage.**

Fumigation of loaded and sealed boxcar. Operator on ground measures liquid methyl bromide from portable calibrated dispenser. Man on ladder sprays liquid (which vaporizes immediately) toward each end of car. Door is sealed with tape.



Fumigation under a gas-tight sheet, using methyl bromide in a 1-lb. can. Dispenser with gasket seal punctures can near bottom, and liquid methyl bromide from can passes through plastic tubing into a pan on top of the pile being fumigated.

# Controlling Storage Insects by FUMIGATION*

**Years of experience has taught the dried fruit industry what the most effective fumigants are and how they can best be applied. Methyl bromide highly satisfactory for general use, while formates meet requirements of individual-pack fumigant**

By CHARLES D. FISHER, Dried Fruit Association of California, Fresno, Calif.

DRIED fruit is subject to attack by raisin moths, darkling beetles, dried fruit beetles and saw-toothed grain beetles, to mention a few. In protecting it from these enemies, fumigation plays a large part. Most growers deliver promptly to the packing house after drying and let the packer worry about protecting the fruit. The grower who stores fruit, however, has learned that fumigation is necessary.

### Early Experience

About 20 years ago, only two fumigants were available in commercial quantities for use on foods; namely, hydrogen cyanide and carbon bisulphide. HCN was widely used, and fatal accidents among handlers were not at all uncommon. The gas was quite effective on natural-condition or low-moisture bulk fruits and grains, but on processed packed fruits containing around 25 percent moisture it was not effective because of its high solubility in water. Its use was very limited in the dried fruit industry after safer fumigants were developed. It has not been used at all since 1934 on dried fruits, because at that time it was found that under certain conditions toxic residues might be built up in moist products which are high in sugar. At that time the Food and Drug Administration would not tolerate more than 25 p.p.m. of such residue.

Carbon bisulphide was also widely used in the 1920's. Since the inflammable limits of carbon bisulphide vapors in air are about 1 to 50 percent, the hazards involved in its use were enormous. Fires and explosions were not uncommon. It was necessary to use about 15 lb. of this substance per 1,000 cu. ft. of space to be fumigated, and it was quickly replaced by more effective and less hazardous materials.

In the late 1920's, ethylene oxide and ethylene oxide-carbon dioxide mixtures came into prominence as

*From a paper presented at Conference on Recent Technological Advances in Army Dehydrated Foods, in Chicago, Feb. 1, 1945.

fumigants. A mixture of ethylene oxide and dry ice proved to be an effective grain fumigant when fed into a stream of grain going into storage. The trade-name "Carboxide" was given to a fumigant consisting of 9 parts of $CO_2$ and 1 part ethylene-oxide, a noninflammable mixture available in pressure cylinders. Straight ethylene-oxide was available in cylinders under low pressure (it boils at 10.7 deg. C.), and it was effective in dosages of 2 to 3 lb. per 1,000 cu. ft. It also was sold as a liquid mixture with ethylene dichloride in drums (Oxyfume).

### Too Expensive

The $CO_2$-ethylene oxide mixture in cylinders proved to be too costly to appeal to most industries, although it eliminated any fire hazard. Most of the ethylene oxide was used as such, and its record from the accident standpoint has not been bad. Its inflammable lim its in air are wide (30 to 80 per cent).

Ethylene oxide is highly water soluble, which is a disadvantage in the fumigation of moist products. And it is not very effective against insects when the fumigation is carried out at low temperatures.

Chlorpicrin, the gas used extensively in World War I, has found considerable use as a fumigant, especially among growers. It is used at a dosage rate of 1 to 2 lb. per 1,000 cu. ft. It has a high boiling point, 233.6 deg. F., and is not very effective at low temperatures. The chief disadvantage of chloropicrin is that it is a lachrimator and is very persistent in the product fumigated. Because of this annoying property, it has never been widely used in packing houses or storages.

In 1935, methyl bromide was investigated as a fumigant for nursery stock, fresh fruits and vegetables by the late D. B. Mackie, who was then entomologist for the California State Department of Agriculture. At the same time the technical staff of the Dried Fruit Association of California started experiments to determine its usefulness as an atmospheric fumigant for dried fruits. Mr. Mackie's first work was with vacuum chambers.

Those who first worked with methyl bromide were amazed at the many properties of this material which contributed toward making it a nearly ideal fumigant. It was more effective at low temperatures than most of the other fumigants, its dosage rate was low (1 lb. per 1,000 cu. ft.), and it was only slightly soluble in water—which gave it excellent killing properties in moist food products. It was nonexplosive and, in fact, had been used in fire extinguishers. It had a high diffusion rate and readily penetrated packages wrapped in transparent cellulose and densely packed materials. Its boiling point (4.5 deg. C.) made it necessary to handle the material in pressure cylinders, but its high specific gravity (1.732) and low dosage rate made handling costs low, considering the space fumigated per cylinder. Until the war, methyl bromide was also available in beer-type cans with concave ends in 1-lb. and ½-lb. sizes. Many types of dispensers have been developed for measuring accurate dosages of methyl bromide.

Ethyl formate, isopropyl formate and other substances used as individual-pack fumigants will be discussed separately.

### How To Use Fumigants

Atmospheric fumigation may be carried out in a specially constructed gas-tight room, under a sheet of material impervious to the fumigant used, or may involve the sealing and fumigation of an entire building or storage space. In any event, the confining surfaces of the space to be fumigated must be made gas-tight. This is not so difficult in a specially constructed room. Satisfactory rooms can be lined with sheet metal or plywood, or may be made of two layers of tongue and groove with heavy roofing papers between. All joints, such as walls to ceiling or sills to floor, should be sealed with asphaltic cement. Cement should also be used to seal joints between plywood or metal sheets meeting on studding. Rooms made of tile, brick or other masonry construction should be painted with asphaltic paint to make them gas tight.

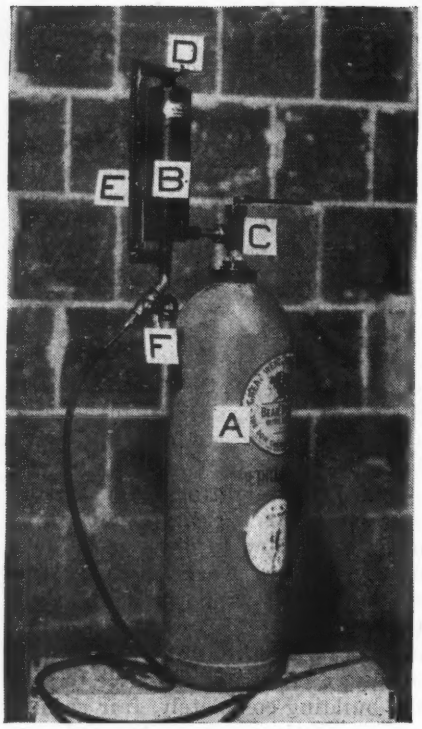
A well-braced refrigerator-type door is widely used in such rooms in the dried fruit industry. The door has a removable sill to facilitate the trucking of materials into and out of the room. Weather stripping of good quality can provide the seal between the wedge-shaped door and the jamb and the removable sill and the floor. Floors should be of concrete whenever possible, since wood floors, unless heavily braced, often sag under load and open seams which allow fumigant leakage.

If a gas-tight sheet or tarpaulin is used to cover a pile of material to be fumigated, the sheet should be of sufficient size to allow a floor lap of at least 2 ft. all around the pile. It is very important that the seal between the sheet and floor be tight, and an excellent way of achieving this is to use flexible tubes filled with sand on top of the sheet lapped on the floor. These tubes can be made of canvas and should be about 2 to 3 in. in diameter and 6 ft. long.

When fumigating an entire warehouse or packing plant, it is often necessary to do a great deal of preliminary work involving the sealing of all windows with paper tape and paste, as well as sealing of doors, ventilators and other openings. If it is impossible to seal the building completely, fair results can sometimes be obtained by greatly increasing the dosage of fumigant or by recharging the building with fumigant at intervals to maintain a lethal concentration for the required time.

Railroad cars of the refrigerator type, and even boxcars, are sometimes used as fumigation chambers. In general, even a refrigerator car is not gas tight after it has been

**Fumigation of individual "arsenal" type cases with small doses (about ½ c.c.) of isopropyl formate. Liquid is squirted into container just before top pad is inserted. Dispenser is foot operated, but it may be actuated mechanically.**




**A 50-lb. methyl bromide cylinder with dispensing unit attached. (A) is methyl bromide supply cylinder; (B) 3-lb. dispensing tank; (C) fumigant valve; (D) bleeder valve which releases air from system; (E) gage glass; (F) valve regulating flow of liquid from dispenser to space being fumigated.**

in service for some time. An experienced operator usually can tell by examining the condition of the bunker doors and the car itself whether or not it is nearly gas tight; drains can be sealed by filling with water. Slight defects can again be overcome by increasing the dosage. Boxcars seldom are tight enough to hold fumigants, but must be sealed with tape and paste around doors and often in joints between walls, ceiling and floor. Often the walls and the floor of a boxcar too are so leaky that it is useless to fumigate without lining the car. Asphaltic kraft paper can be used for this purpose.

Permanent fumigation rooms usually are fitted with a small pipe or tubing leading from a conveniently located fitting near the door to a shallow pan hung near the ceiling in the center of the room. When the room is ready to fumigate, a cylinder of methyl bromide with a small dispensing tank attached is rolled up on a hand truck and a flexible tube from the dispensing tank is attached to the fitting. The dispensing tank is filled with liquid methyl bromide by opening a valve on the line leading to it from the eductor tube of the supply cylinder. A boiler-gage glass on the dispensing tank, calibrated in ½ or ¼-lb. units, enables the operator accurately to introduce the desired dosage into the room. The dosage is always based on the cubic content of the empty room, regardless of the amount of material in the room.

The same type of dispenser may be used for the fumigation of piles of food under gas-tight canvas. In this case, a pan is placed on the top center of the pile and boxes or sacks are stacked beside it to provide some head space. A tube is led from the pan down the side of the pile and under the floor lap of the gas-tight tarpaulin, where the connection is made to the dispensing tank.

Buildings may be piped and the fumigant introduced from cylinders outside the building. More often, however, cylinders are placed at strategic points, and operators with gas masks quickly open the valves and leave the building. When methyl bromide is the fumigant, most cylinders are placed on the top floors because the gas is about 3.5 times as heavy as air. Railroad cars usually are fumigated by blowing half the charge from the dispenser toward each end of the car and quickly closing the door.

### Individual-pack Fumigants

Individual-pack fumigants have been used for many years on bulk packs of dried fruits, such as 25 lb. fiber cases. The fumigant (a liquid) is poured directly on the fruit just before the case is sealed. Automatic dispensers are activated by the individual boxes as they travel along the packing line. Another type is activated by the tripping of the automatic weighing machine, and the liquid fumigant is mixed with the fruit as it falls from the weighing hopper. Army packs of dried fruit, consisting of fruit in chipboard shells in an arsenal-type master case, are fumigated by dispensing the fumigant directly onto the chipboard just before the inner flaps of the master case are taped together.

Individual-pack fumigants must meet certain requirements to be successful. First, of course, they must be toxic to insects and not highly toxic to workmen. Also, they must not leave toxic residues or disagreeable odors in the product. Such a fumigant must have a boiling point high enough that it does not vaporize and escape before sealing of the package is accomplished. However, it must vaporize fast enough to provide a lethal concentration of its vapor to insects over a period of several hours.

Two substances seem to meet all these requirements and are widely used today. Both are formates, one isopropyl formate and the other ethyl formate. We have made several large-scale comparative tests of the two in solid-fiber standard raisin packages and find them to be nearly equal in performance. Dosage rates are 5 to 7 c.c. per 25-lb. solid-fiber raisin case and 3.5 to 4.5 c.c. per arsenal case.

Chlorosol (ethylene dichloride-carbon tetrachloride mixture) and Oxyfume (ethylene dichloride-ethylene oxide mixture) also have been used as individual-pack fumigants but are not as satisfactory as the formates.

Experiments are under way with new dispensers which we hope will enable us to accurately measure small amounts of these individual-pack fumigants automatically into small cartons of food products. We believe that we will be able to accurately measure 0.2 c.c. of fumigant mixture into small cartons of dried fruit, for example, at a rate of at least two cartons per second with a single dispenser.

Ethylene oxide kills yeast and mold, and we hope to be able to fumigate small individual packages of foods automatically with a mixture which will destroy yeast, mold and insect life in one operation.

### Residues Left

Residues reported after methyl bromide fumigation of foodstuffs using 2 lb. of methyl bromide per 1,000 cu. ft. for 24 hours, or three times the normal dosage, showed retention of 2.6 p.p.m. (expressed as bromide) in raisins, 1.6 p.p.m. in dried peaches, 2.8 p.p.m. in dried apricots, and only a trace in prunes. These results were obtained by Dudley, Miller, Neal and Sayers, and reported in *Public Health Reports*, volume 55, No. 49, 1940. Rolled oats retained 130 p.p.m. 48 hours after fumigation, and raw cashew nutmeats 148 p.p.m. Oil-bearing foods tend to absorb more of the oil-soluble methyl bromide, but this fumigant has found wide usage in the treatment of nutmeats, and similar products.

Little is known about the residues left by the formates in individual-pack fumigation. But they have been used for many years—without objection on the part of consumers or the food enforcement officials—so we are about ready to call the experiment a success.

# Freezing Cooked Foods

**PART II—Continuing his discussion of the types of cooked foods that can be frozen successfully, the author reports his findings with respect to combination dishes, bakery products and several miscellaneous foods**

By J. G. WOODROOF and IDA S. ATKINSON,
Georgia Agricultural Experiment Staton, Experiment, Ga.

THERE seems to be little demand for freezing fried foods. This includes steaks, chicken, pork chops and fish and other seafoods. Such foods usually are cooked in batter for crispness and served hot. Our experience has shown that these foods held in freezing storage lose crispness and gradually develop a warmed-over flavor. This may be due to the fact that it is not practicable to package these foods in a solid pack. If they are to be frozen after being fried, they should be covered with gravy, sauce or oil.

Large cuts of meats cooked by boiling, baking or roasting can be very satisfactorily preserved by freezing when adequately wrapped. To reduce exposure to air to a minimum, such meats should be wrapped in as large pieces as possible and cut immediately before serving.

Other cuts of meat which may be preserved in excellent condition by freezing after being cooked include stew meats and trimmings which can be packed solid and protected from the air by covering with broth or fat. Also, broth obtained from cooking bony pieces can be satisfactorily kept for many months. The fat will separate and collect on the surface, but on reheating will recombine with the other ingredients.

### Freezing Combination Dishes

Combination dishes containing meat and vegetables may be frozen with very good results. Beef stew, shrimp creole, lobster Newburg and vegetable-beef soup all have been successfully frozen in the laboratory. In the case of creole, the fat separated during freezing, but reheating after thawing reverted it to a homogeneous mixture.

Ten different combinations of ingredients of sauces for meats and vegetables were cooked and frozen to find out the effect of freezing on the various combinations. Some or all of the following were in each sauce: Butter, flour, salt, skimmed milk, whole milk, cream, whole eggs, egg yolks and cheese. After freezing, examinations were made of the appearance, color, aroma, flavor and texture of the thawed sauces before and after heating.

Formula 1—Sauce for creamed vegetable and meat dishes.

| | |
|---|---|
| Flour | 2 tablespoons |
| Fat | 2 tablespoons |
| Salt | ¼ teaspoon |
| Milk | 1 cup |

Melt fat in top of double boiler, blend in salt and flour and cook for five minutes. Add milk gradually and stir until mixture thickens.

After freezing and thawing, this sauce was slightly watery on top was readily reconstituted by stirring and heating. Thin and thick white sauces proved equally satisfactory.

Formula 2—for Newburg, thermidor and rarebit sauces.

| | |
|---|---|
| Flour | ¼ teaspoon |
| Fat | 1 tablespoon |
| Salt | ¼ teaspoon |
| Cream | 1 cup |
| Egg yolks | 1½ |

Make white sauce using half of the cream. Beat egg yolks with remainder of cream, add to sauce and heat to consistency of cream.

Upon thawing, this sauce was very smooth and creamy. When skimmed milk was substituted for cream, the fat in this sauce, which was frozen, thawed and heated, separated and formed in droplets on the surface. Whole milk substituted for cream was very satisfactory.

A whole egg substituted for the egg yolks and flour gave a sauce with less yellow color and less creamy texture but was very satisfactory for freezing.

**TABLE III—The Desirability of Nine Frozen Cooked Meat Products After Six Months to One Year in Storage at 0 Deg. F.**

| Meat dish | Form packed | Desirability |
|---|---|---|
| Beef, roasted | Whole, solid pack | Excellent |
| Beef, roasted | Sliced, semi-loose pack | Good |
| Beef stew | Solid pack | Excellent |
| Brunswick stew | Solid pack | Excellent |
| Chicken: | | |
| A la King | Solid pack | Excellent |
| Fried | Loose pack | Fair |
| Roasted | Whole, semi-solid pack | Good |
| Lobster Newburg | Solid pack | Excellent |
| Shrimp creole | Solid pack | Excellent |

**Paraffined paper "tubs." Left to right, first row: Schrimp creole (in front) and lobster Newburg (in back). Second row: Chicken a la king (in front) and deboned chicken and gravy (in back). Third row: Three containers of Brunswick stew. Last row: Cooked sausage, packed in peanut oil.**

One-fourth cup of grated cheese added to any of the above sauces produced a rough, slightly curdled appearance, which was probably due to the age and condition of the cheese. Freezing, thawing and heating of the product did not change this condition.

Formula 3—Fondue

| | |
|---|---|
| Fat | 1½ tablespoons |
| Salt | ¼ teaspoon |
| Whole eggs | 3 |
| Grated cheese | ½ cup |

Combine all ingredients in top of double boiler and stir constantly until mixture is smooth and creamy.

This sauce was the only one containing cheese with a very smooth texture. The eggs aided in emulsifying the fat of the cheese, and after freezing it remained in excellent condition.

All frozen sauces except those containing skimmed milk or cheese —with exception of fondue—were indistinguishable from unfrozen sauces when thawed and heated. Because of the low temperature at which eggs coagulate, sauces containing eggs should not be heated above 160 deg. F. to prevent curdling. Eggs may be omitted from a sauce to be frozen and added when the sauce is thawed and heated.

In freezing cooked foods, the type of package and method of packing are important. Air must be excluded as much as possible. Contact of frozen cooked vegetables or meats with air imparts a warmed-over aroma and taste. With the exception of special items, there should be no loose-pack frozen cooked foods. In all of the products reported, a solid pack is most desirable. More rigid containers were required when products were packed without covering with liquid.

### Freezing Bakery Products

Bread of all kinds, rolls, biscuits, fruit cakes, pound cakes, plain cakes, gingerbread, cookies and pies have been kept successfully in freezing storage for many months —provided they were so packaged as to prevent desiccation.

Whether cooked or uncooked, frozen pies and other moist bakery products gradually loose moisture through desiccation. And they loose flavor through volatilization. This does no apparent harm to the consistency of the pastry, but causes the filling to shrink, and it may change in color. Upon thawing, this process is almost reversed, as pastry is likely to absorb moisture and loose crispness, while rolls and other moist breads will reabsorb moisture.

### Miscellaneous Foods

Pasteurized cream and butter can be kept in freezing storage for long periods of time.

Freezing storage is utilized to some extent to hold American cheese at a specific degree of ripeness. Well-ripened cheese is cut into pieces suitable for market demand, wrapped in its final consumer package and fast frozen. There is no appreciable alteration in flavor. However, when the frozen cheese is thawed out, the body shows a definite tendency to dry out rapidly and become coarse and crumbly.[6]

Low temperature greatly extends the time that canned foods retain their high quality. Canned goods, which usually contain small amounts of sugar or salt, freeze at about 26 deg. F. Other than a slight increase in softness of such products as snap beans, asparagus, okra and tomatoes, there are no permanent alterations in them after they are thawed. Canned foods containing cooked starch—such as cream-style corn, thickened soups, potatoes, dry beans or peas—are changed in physical form. But upon thawing, the original form is completely restored. Canned meats are rendered slightly more soft by freezing, while the palatability remains good for an indefinite period. Cooked meats for freezing should contain as little fat or seasoning as possible.

Roasted peanuts and peanut products—including peanut butter, peanut butter sandwiches and candy—are kept in excellent condition when frozen.

Because freezing breaks the emulsion, mayonnaise should not be frozen nor should it be combined with other foods for freezing. Oils and vinegar are substituted for mayonnaise. To date, fresh vegetable salads have not been very successfully frozen, although in a few cases it is being done.

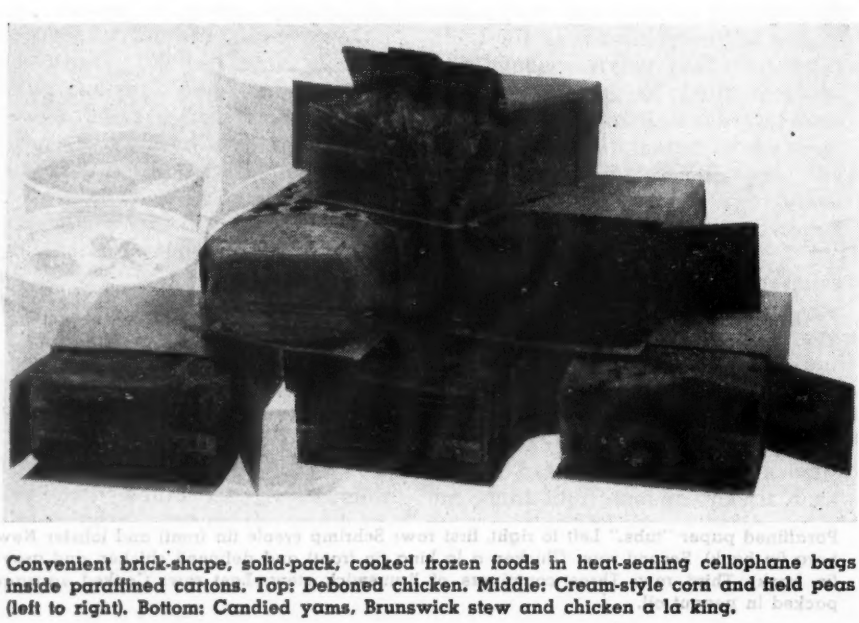
Dill and sweet pickles become limp and tough when thawed and have a large amount of leakage.

### Thawing and Serving Frozen Cooked Foods

Frozen cooked fruit may be served with traces of ice remaining in the pack. Or it may be thawed completely and in some cases warmed, since there is no texture to be injured by thawing. Vegetables and meats naturally will be thawed and heated. Additional seasoning may be needed before serving.

Sauces containing eggs should not be heated over 160 deg. F. or the eggs will cause curdling.

Bakery products and other crisp foods should be thawed in the package to prevent moisture from condensing on the food and causing it to be soft. After complete thawing, they should be kept airtight until served.



**Convenient brick-shape, solid-pack, cooked frozen foods in heat-sealing cellophane bags inside paraffined cartons. Top: Deboned chicken. Middle: Cream-style corn and field peas (left to right). Bottom: Candied yams, Brunswick stew and chicken a la king.**

### Summary

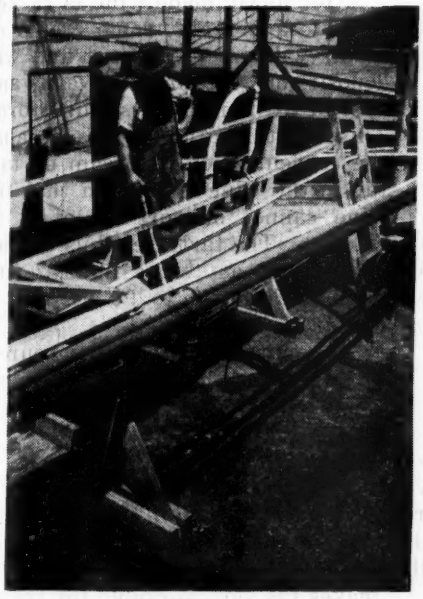
1. When properly prepared, packaged and stored, a very wide variety of fruits, vegetables, meats and combination dishes may be satisfactorily cooked and frozen. It is much more difficult to hold the vola-

(*Turn to page* 190)

# How Tartrates Are Recovered From Winery Wastes

**PART I—With processes developed in California in recent years, it is profitable to remove the tartrates. In fact, one season's operations may pay for the extraction plant. Here are complete details of the methods employed**

By ZE'EV HALPERIN, Chief Chemist, Petri Wine Co., Escalon, Calif.



**Compressed air agitation of still slop material after bentonite has been added to clarify the material. After settling, the clear portion is pumped to another tank and from it calcium tartrate is precipitated.**

FORMERLY considered a nuisance problem, the utilization of industrial wastes has now become one of growing economic importance in some branches of the food and beverage industry. For this reason, processes have been developed for the recovery of tartrates from winery wastes.

In winery parlance, tartrates are all materials containing tartaric acid or its metal salts. Most common among these are potassium bitartrate, known as cream of tartar, and calcium tartrate. Although tartrates are found, in small amounts, in various types of plants, only the grape has a sufficiently high concentration to warrant commercial scale recovery.

In grapes, tartrates are distributed in the juice and skins of the berries and in the stems. When the grapes are crushed, in the process of wine making, the tartrates are carried into the wine, and from there they eventually find their way to the winery wastes.

### Sources of Tartrates

Waste materials become available at several points in the wine production process. These wastes differ in composition, so the processes for recovering tartrates are different for each waste. These wastes are wine lees, distilling material, still slop, grape pomace and wine stones from storage and fermenting tanks.

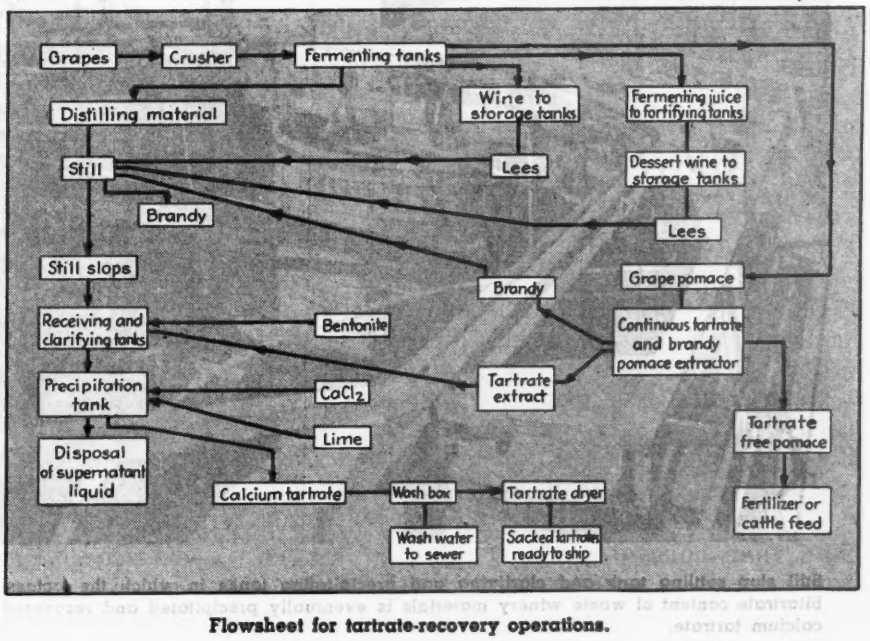
After newly made wine has been placed in storage tanks, a considerable amount of insoluble matter, including yeast cells, pulps and tartrates, settles out. This sediment is called "wine lees."

Three types of lees are found in normal wine production activities: (1) table wine lees, (2) dessert wine lees, and (3) refrigeration lees.

The lees produced from either red or white table wines will vary in tartrate concentration, depending on the method employed in the production of each type of wine. In red table wine production, the grape juice and grape pomace (skins and seeds) are allowed to ferment. When fermentation is complete—i.e., when all available sugar has been converted into alcohol—the wine is drawn off the pomace and placed in storage tanks where the lees will settle out.

In the production of a white table wine, the grape juice is drawn off the pomace before fermentation, pumped to another tank, and allowed to ferment.

Usually, red wine grapes contain




**Flowsheet for tartrate-recovery operations.**

a higher concentration of tartrates than white grapes, and the lees derived from red wine will be somewhat richer in tartrates than those from white table wine production. The average concentration of tartrates for table wine lees, red or white, is from 0.1 to 0.3 lb. of potassium bitartrate per gallon, with a slight "plus" for those from red wine.

In the production of dessert wines, the general practice is to allow the juice to ferment only partially. At a point in the fermentation proceedings, when the desired sugar concentration is reached, the fermenting juice is pumped to a fortifying tank. Brandy is added to arrest fermentation by its inhibitive action on the active yeast cells. This increases the alcoholic content of the wine up to 21 percent. When the fortification with brandy is complete, the dessert wine is pumped to a storage tank, where the lees are allowed to settle out.

The lees from dessert wine, which have a higher alcoholic content than table wine lees, are generally higher in tartrate content than the latter because cream of tartar is less soluble in a higher concentration of alcohol. Additional tartrates, therefore, will precipitate out of the dessert wine and collect in the lees. Dessert wine lees will contain from 0.2 to 1.0 lb. or more of cream of tartar per gallon. The alcoholic content will vary from 10 to 17 percent.

Cream of tartar is only slightly soluble at lower temperatures. In order to render wines stable and clear, they are cooled to as low as 16 deg. F. At this temperature, some cream of tartar will precipitate out of solution and settle in the bottom of the tank. Since wine subjected to refrigeration has previously been freed of most of its solid impurities, the lees derived from this process generally are cleaner and richer in tartrates than either table or dessert wine lees. Cream of tartar concentration of these lees will vary from 1 to 3 lb. or more per gallon, and they will contain 12 to 17 percent of alcohol.

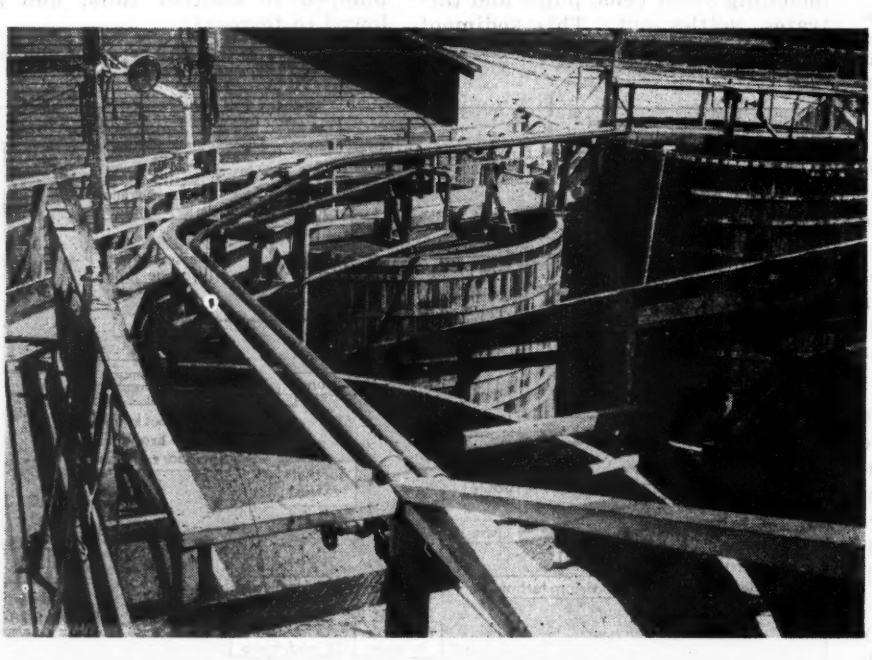
The variation of tartrate concentration figures in lees is due to the extreme variability in the distribution of cream of tartar, depending upon the initial tartrate concentration in the grapes and methods of wine making applied.

### Grape Pomace

Skins, short stems, seeds and pulp left in the fermenting tank after the removal of the wine or of the grape juice comprise grape pomace. The concentration of tartrates in grape pomace will vary from 1 to 5 percent, depending largely upon the concentration in the grapes and the methods used in wine making.

### Brandy Still Slop

All dealcoholized winery materials used as a source of raw material for the distillation of brandy either for fortification purposes or for the production of commercial brandy are called "brandy still slop."



**Still slop settling tank and clarifying and precipitating tanks in which the potassium bitartrate content of waste winery materials is eventually precipitated and recovered as calcium tartrate.**

"Distilling material," as this raw material is termed by the trade, may consist of material derived from the refermentation of dessert wine pomace, from wines produced exclusively for distillation purposes, pomace water washes and pomace press wines. These materials are dealcoholized by distillation, and the discharged liquid from the still is used for the recovery of tartrates as outlined below.

The concentration of cream of tartar in still slop will vary from 0.02 to 0.07 lb. per gallon, depending again upon the initial tartrate concentration in the grapes and the wine making methods employed.

### Wine Stones

After newly made wine is racked into storage tanks, some cream of tartar will precipitate out and will deposit on the inside walls and floor of the tank in crystalline form. This crystallization occurs because the concentration of cream of tartar in the wine is so high that the wine cannot support all of it in solution. The tartrates thus formed are known as "wine stones" and contain from 70 to 90 percent of cream of tartar.

As compared to the other sources of tartrates, this one is of minor importance.

### Recovery Procedures

The first step in tartrate recovery is distillation of the lees, which serves two purposes: (1) It strips the lees of their alcohol, and (2) it makes the slop workable for the recovery of tartrates in the form of calcium tartrate. During the distillation process, all crystalline cream of tartar will go into solution and thus will enter into the precipitation reaction to follow. This occurs through the heating action of the distillation process and is aided by the dilution of the material by condensed steam.

The lees slop is pumped from the discharge point of the still into settling tanks, the size of which depends on the distilling capacity of the plant. A good practical figure is that the gallonage of the settling tanks be sufficient to handle double the amount of distillery slop produced daily. Thus, a winery producing 50,000 gal. of distillery slop per day should have a 100,000-gal. capacity in the settling tanks.

In the settling tanks the slop is permitted to settle for from 12 to 18 hours. This will allow sufficient time for the solid matters suspend-

(*Turn to page* 200)

# EDITORIALS

LAURENCE V. BURTON, Editor

## Japanese Atrocities

Now that reports of Japanese atrocities are being released, it is possible to reveal a 1944 conversation with Sir William Webb, Chief Justice of the Supreme Court of Queensland, and Chairman of the Australian Commission to Investigate Japanese Atrocities. After a personal inspection of every possible case, he stated that the crimes the Japs committed were so revolting that he hated to discuss them even among men, that castration of prisoners was one of the less offensive of their crimes.

Being a judge, his appraisal of Japanese acts is most judicial. As nearly as can be recalled, he said: "Apparently it is not Japanese policy to permit what we regard as atrocities; neither is it their policy to prohibit atrocities. Therefore, the captive undergoes whatever treatment the commanding Japanese officer thinks is proper. This accounts for the conflicting statements from escaped prisoners. Some of our chaps will stoutly maintain that the Japanese are chivalrous enemies. This is the truth—as far as they know it; but it is not the whole truth. For every man who has had this sort of experience, there are many more who know the Japanese as cruel, unchivalrous barbarians."

Americans are now being told of the same sort of fiendish torture of our soldiers. From what we know, it is apparent that the Japanese are not even half-civilized. The Chinese theory that the Japs are recently descended from monkeys is a slander on the simian tribe.

Let no one be fooled or softened by their present meekness, bowings and apologies.

## For High Wages

"No WAGE is 'too high' that is earned!" was the theme of a recent ad signed by Henry Ford and his grandson. This truism is the basis for the high wages that Ford has paid and in which he has been the leader in the United States. It was the basis for the astonishingly high wages paid by Jack & Heintz during the height of war production.

In each case, the firm introduced new manufacturing methods that made productivity per worker so high that high wages could be earned.

High productivity per worker and high rewards per worker are well nigh inseparable twins. But both management and labor, especially *organized* labor, must learn it and must cooperate to the foregoing end. Otherwise, a third factor, the strike, may enter with all its blunderings to confound what should be a reasonably simple matter.

While it appears unlikely that such spectacular developments as Jack & Heintz can ever be paralleled by the food industry, there is a lesson for all in what these Clevelanders have done. Mr. Heintz is nothing short of an engineering genius. One of the many special machines that he invented, operated by a young lady wearing street clothes covered by a smock, does in one sequence of automatic operations what formerly took 56 operations on eight different machines. No wonder that Jahco could afford to pay workers wages that ranged from $3,000 to $6,000 a year for machine tending. Mr. Jack, ex-business manager of a labor union, shared the production improvement with the workers whom he calls "associates."

While space here does not permit an exploration of the other factors in Jahco affairs, the principle of paying high wages for high productivity is one that will work in any industry. Jahco was very smart in hand-picking the employees. They were all of a very superior type, with exceptionally high intelligence. They seemed to understand and to cooperate. The management cooperated, too.

High wages can be paid if they are earned. They should be paid ungrudgingly if they are earned.

## Future of Milk Distribution

EVERY other day delivery of milk to consumers, a wartime economy, is the greatest single economy in the distribution of milk ever developed. It has, however, been largely offset by wage increases to route salesmen. This means that if daily deliveries are resumed, the retail price of milk must be increased by a calculated one cent a quart. A careful study of the problem has been published by the Maine Agricultural Experiment Station in Bulletin 437, which also reviews the experience in other states.

Volume of dairy products distributed per man was increased 34 percent on retail routes in Boston and Portland, but wages to route salesmen were increased 38 percent in Boston and 44 percent in Portland. Truck mileage did not always decrease as had been expected. Sometimes it actually went up due to greatly increased sales.

If daily deliveries are to be resumed at present wage rates, the cost will be increased by an average of 0.89 cent per quart in Boston and 0.74 cent in Portland which, together with increased truck costs of 0.2 cent per quart delivered, will add up to about 1 cent per quart to the consumer. So much for the Maine report.

What if enough consumers demand daily milk delivery to force its restoration? Presumably, they can pay the 1-cent increase if we have full

employment in the country. But it appears unlikely that the route salesmen will accept a parallel restoration of prewar wages.

Are further economies possible in distribution of milk? Technically speaking, we believe there are, though how practical they may be must be left for actual trials. The foreseeable technical possibilities are: (1) Bottled concentrated pasteurized milk from which half or more of the water has been evaporated under vacuum at low (95 deg. F.) temperatures; or (2) an improved dehydrated milk powder that will reconstitute in perfect condition.

Either of the foregoing products would save something on distribution costs, but to be most effective should be manufactured close to the milk-producing farms. It would therefore amount to a minor revolution, and it is doubtful if any established dairy company with large investments in city plants will attempt it, unless union demands force higher prices that will result in curtailed consumption of milk.

To this extent the unions will control the future developments. But newcomers to the milk distribution field, who have a fully developed process but no expensive city plants to write off, might conceivably elbow their way into the market with a cut-price proposition.

The future holds considerable economic peril for both established dairies and drivers' unions. Incidentally, it is a place where technology and production may solve a distribution problem.

## Harbinger of Things to Come?

THE government, according to reports, has had to purchase up to late September, about 6,000 carloads of the 1945 potato crop. This had to be done in order to meet its price-support obligations to potato growers. Potato prices to the growers have been pegged at $1.85 per hundredweight, f.o.b. shipping point. The government did not have to buy these potatoes if there had been any private buyers at the then prevailing prices. But private purchasing was weak, so the government stepped in to take over the surplus. What did it do with its purchases? Some were donated to poor institutions, others were shipped to potato starch factories in Maine at an added freight cost to the government of 60 cents per hundredweight, making the net cost $2.45. The government is reported to have received from the starch factories 30 cents per hundredweight of potatoes delivered. A neat transaction that!

Secretary of Agriculture Anderson is concerned. He frankly admits he has been forced to buy more potatoes than he wants to. Incidentally, the harvesting of northern potatoes has only just begun. Also, and not so incidentally, potatoes are only one of many commodities that the government is obligated to support.

Now is the time to make plans for disposing of any agricultural surpluses if they materialize.

## Two Unwise Plans

EVEN though it is highly desirable to smooth out the curve of business fluctuations, we do not believe the technics proposed in Senator Murray's full employment bill will accomplish the objective. The bill seems to empower the President to proclaim an imminent depression and start a program of government spending to offset it. After our experiences in 1930-40, we should know that such a proclamation will create the depression. If the country chooses to go Left, let's do it sensibly.

A similar fault lays in a proposed bill to give a rather high unemployment compensation. Such a measure will make this compensation the minimum wage. Which is satisfactory, if people will work rather than loaf on a generous unemployment check. After all, there is a very considerable amount of work to be done in this world. The purpose of such compensation is to eliminate hardship, not work. Let's also be sensible about this plan.

The American people must realize that not all of us have a highly developed sense of duty. Congress should examine further methods before acting hastily.

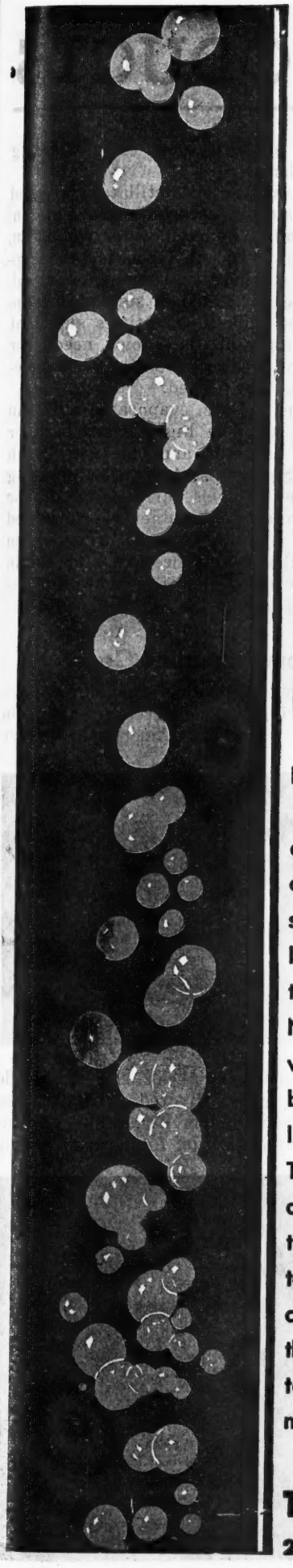
## Frozen Food Stores—An Opportunity

OPINION among owners of the new stores dealing in frozen foods is interesting. They believe that as soon as freezer cabinets are available and installed in consumers' homes the consumer purchases of frozen items will jump to sizable figures. Current plans are to sell what small purchases the women will carry away in their market bags, but to expect the average sale to go to figures between $5 and $10 when people are storing their own stocks in their home freezers.

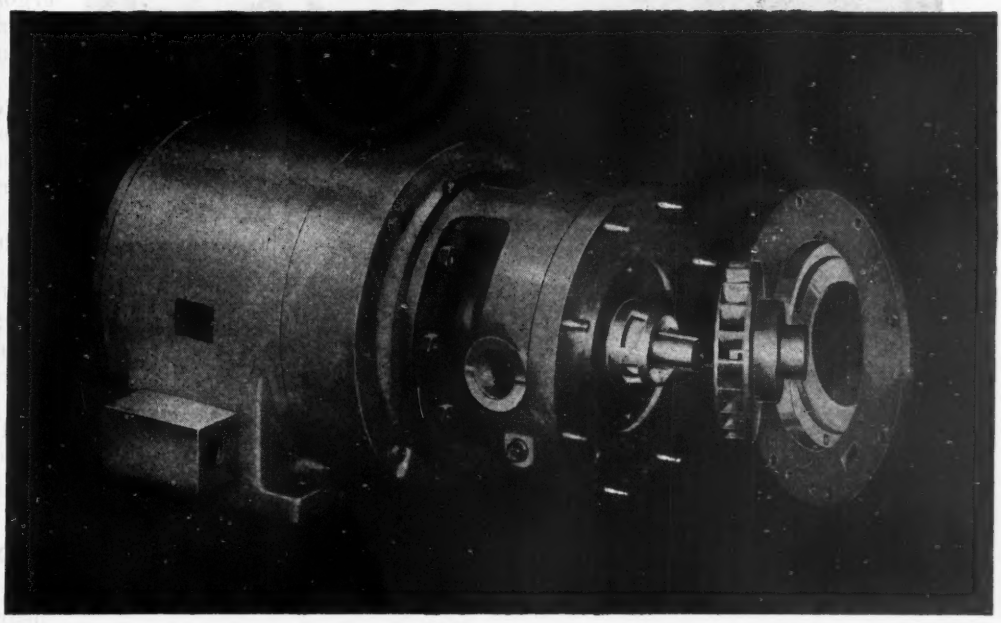
Complaint has been expressed by some storekeepers that the less known manufacturers of frozen foods do not have enough suitable sales promotion pictures to occupy the wall space. A frozen food store that sells nothing else has everything down in low cabinets. There are no shelves piled as high as a clerk can reach. The empty wall space could be used for promoting impulse purchases, as well as portraying the methods of production. It is an opportunity that should not be neglected. Either the space should be made to sell a satisfactory volume of goods or the storekeeper will be apt to fill it up with something else that will make up the requisite sales volume.

## How to Avoid a Better Job

IN our quest for an engineering editor some odd things have developed. Like a packaging engineer who never read any magazine because his employer did not pay for these facilities for self-advancement. Men who are not ambitious enough to develop themselves usually miss the boat.



# ONLY CLEAN AIR CAN REACH YOUR PRODUCT FROM A NASH COMPRESSOR

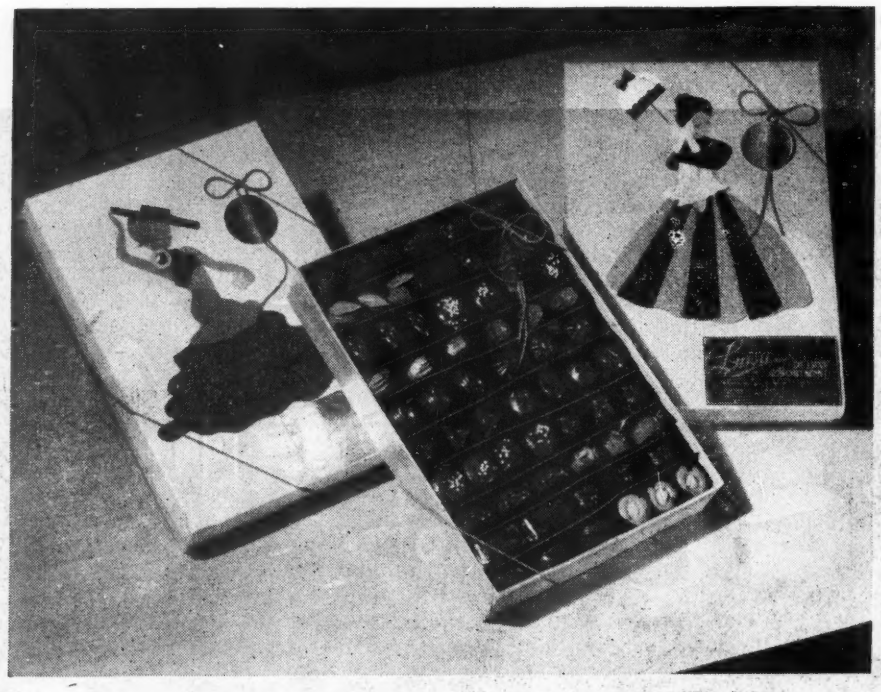


Here is a compressor designed perfectly to meet the needs of the Food Plants. It is simple, for it has only one moving part, a rotor cast in one piece and rotating in the casing without metallic contact. This means trouble-free operation over long periods. It is compact and requires little valuable floor space. Its oversize ball bearings seldom require attention or lubrication. No lubrication is required in the interior, so that the air is kept clean from the time it enters the pump. • But this is not all. The compressing medium in the Nash Pump is a rotating column of clean water. The air is in intimate contact with this water in passing thru the pump and is actually scrubbed while it is being compressed. Dust present in the atmosphere is removed, and the air delivered free from dirt, oil, or heat, without the use of scrubbers or air washers. Think what this means in terms of purchase cost and floor space occupied by complicated air washing apparatus. • These pumps are proving their worth in the most trying service. They are ideal for transferring beer or wort from tank to tank by air pressure, for maintaining pressure on aging tanks, for supplying compressed air to bottling machines in racking, etc. • Available in any capacity, these pumps deliver pressures up to 40 lbs. absolutely uniform without storage tanks. • You want the most reliable pumping equipment in your plant, so by all means find out more about the Hytor. Our catalog No. 217 is free on request.

**THE NASH ENGINEERING COMPANY**

**243 WILSON ROAD • SOUTH NORWALK, CONNECTICUT**

# NEW PACKAGES & PRODUCTS



## Luxury Sweets

LUISA had been a famous name in candy for three generations when Armando Spagnoli came to America several years ago. In Italy, one brother ran a large box making plant while another was head of the candy factory. Here Spagnoli combines the two interests. He not only plans and supervises every operation in the candy manufacture, but he designs the boxes.

Box designs are changed frequently. The quality of the contents and the workmanship are never varied. Two of the current designs are Josephine and La Rhumba. Josephine has the red and black striped skirt, La Rhumba is distinguished by multicolored flounces. The figures are cut from colored felts and applied with adhesives.

The Luisa seal is in gold on a red background, and is used on all of the packages.

## Pie Filling

TIMED for the fall demand. Dry-Pack Corp., New York, is distributing a pumpkin pie mix. Lightly seasoned with cinnamon, clove, nutmeg and ginger, the mix contains powdered pumpkin and sweet potato, salt, dextrose and spices. The 4-oz. package requires the addition of ⅓ cup sugar, ¾ cup boiling water and an egg to make the filling for one 9-in. pie.

An institutional pack containing 1½ lb. of the mix is also offered.

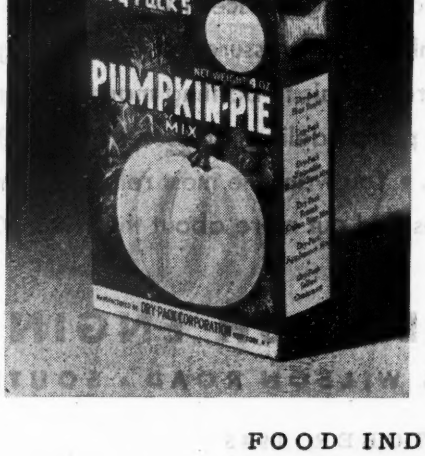
Blue and a pumpkin color predominate in the labels of the printed carton. A heat-sealed waxed bag holds the powder.

## Complete for Baby

EVAPORATED MILK has been fortified with minerals and vitamins to make a "complete" infant food. It is being distributed under the registered trade mark Formulac, by National Dairy Products Co., Inc., New York. The formula was developed by Dr. E. V. McCollum, an internationally known nutritionist and authority on child feeding problems.

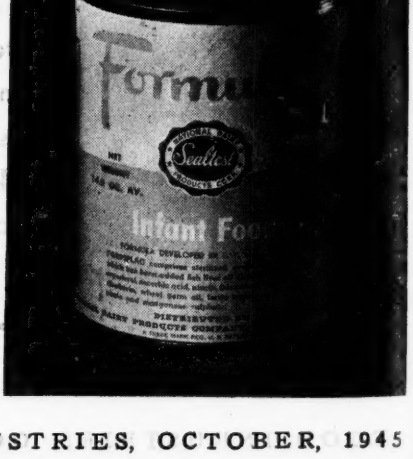
Fish liver oil distillate, activated ergosterol, ascorbic acid, niacin, thiamine hydrochloride, riboflavin, wheat germ oil, ferric lactate, copper sulphate and manganese sulphate are added to sterilized evaporated milk in quantities sufficient to supply all the known needs for infant feeding. No vitamin supplements are needed.

The 14½-oz. evaporated milk can is used. The highly glazed paper label is white and pale grey, with the Sealtest seal and the printing in red. Panels carry a list of the vitamins and minerals contained and the approximate composition for the convenience of the doctor in prescribing quantities and dilutions for feeding.




## From Argentine Geese

SOUTH AMERICAN products are appearing in much greater variety in U. S. Markets. Among the luxury imports is a 4¼-oz. can of pate de fois gras flavored with truffles, packed under Argentine government inspection for Kraus Trading



Corp., New York. Ingredients include goose liver, goose meat, butter, salt, pepper, sweet smelling herbs and the truffles.

The Galli brand label is in yellow, with a formalized border in red and orange.

## For Home Made Pies

PIE CRUST MAKIN'S contains only flour, vegetable shortening and salt. It is claimed to make the home-type of crust, with the addition of a very small amount of ice water. The package holds 8 oz., enough for one two-crust pie.

Following the vogue for dark backgrounds, the package is a deep chocolate brown, with yellow and

red in the design. Detailed instructions for use are carried on a yellow panel forming the reverse face of the package.

Muffin Makin's Co., Inc., New York, is the manufacturer.

## Cheese Tin

GRATED CHEESE, Italian style, is being marketed apart from its spaghetti dinner pack, by Magic Chef Food Products Co., Bridgeport, Pa.

The grated cheese is packed in a small tin holding 1½ oz., which is vacuum sealed to insure freshness. It is stated that an improved method of grating, developed by the manufacturer, leads to greater uniformity of flavor and retains other desirable and valuable properties of the cheese.

The label uses red, white and green as a background for the Magic Chef logotype and the new picture of the chef which was adopted when the company redesigned its spaghetti dinner box some months ago.

A panel suggests uses for the

cheese and another is a "tie-in" reminder of the Magic Chef Prepared Sauce. In spite of the difference in size and material of the packages the family design is achieved without awkward adaptation.

## Effective New Labels

STRIKING in design, the label newly adopted by Richard Frank & Co., New York, for its bakery and confectioners supplies carries the company name in bold black and the RF seal in red against a shaded yellowish-brown background. The new label will be used on fountain sirups, flavoring extracts, dessert preparations and "Colonial Brand" hot chocolate powder.

The package shown is a 9-lb. tub of specially treated heavy board, sufficiently moisture vapor proof for use on gelatine desserts, pie fillings, cake mixes, powdered punch and other hygroscopic materials. The cardboard slipcover is sealed to the body of the container with a cloth tape.

**No More $TONE$ in Your Bottle-Neck!**

• Now, with critical war shortage of labor, streamline STONING in your mill. Removing stones has always been slow, laborious and costly out of proportion to other steps in processing cereals, soy beans, and other dry foods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic metals, and all other hard, dangerous contaminations from cereals, soybeans, and other beans, and other food products with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour.

*Write for Bulletin FI-1045*

SUTTON, STEELE & STEELE, INC.
DALLAS, TEXAS
In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign—Separations Engineering, Ltd., 133 Bush House, Aldwych, London

## SHE EXPECTS MORE FOODS TO BE VITAMIN ENRICHED

Taste will probably always be the largest single factor in determining the sale of a food. BUT that is no longer the whole story!

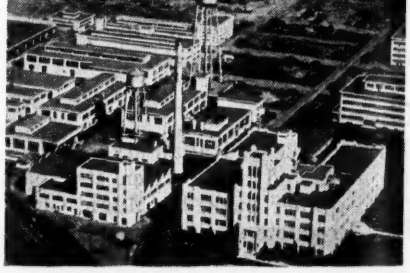
Housewives who have been studying nutrition, and men returning from the Services, have *experienced* the benefits of *improved* nutrition.

They are going to watch the labels for vitamin declarations, to pay particular attention to enriched values.

That is why the end of allocation of most vitamins has witnessed a renewal of the movement, by leaders in the food field, toward restoration and enrichment of certain foods hitherto profitable.

Are *you* sure *your* products will continue to appeal to the public as foods nutritionally well-rounded?

Why not consult our Vitamin Division?



**HOFFMANN-LA ROCHE, INC.**
**Vitamin Division, Nutley 10, N. J.**

# FOOD INDUSTRY NEWS

## GENERAL

## Foods in Short Supply Affected by Army Cuts in Food Buying Program

### Cutback percentages reveal the extent to which the armed services have curtailed food purchases since V-J Day

SHARP, deep cuts in food buying for the Army have been announced by the War Department, and many of the foods affected are those that have been in short supply for civilians. The reduction in the procurement program for the 12 months starting October 1, as compared to the rate of procurement that was planned before V-J Day, on the basis of a continuing war in the Pacific, has been announced in the following percentages: Meat, 54; sugar, 51; fats and oils, 48; lard, 44; shortenings and other edible oils, 54; dairy products, 61; butter, 62;; evaporated milk, 57; dry skim milk, 71; dry whole milk, 39; evaporated fruits, 57; apples, 51; apricots, 62; peaches, 55; prunes, 54; raisins, 59, and grain and flour, 49.

Cheese is expected to be out of the market until well into 1946, just when depends upon whether or not other agencies take over part of Army's present inventories.

During the first week of September, contracts for the purchase of dehydrated beets amounting to 404,000 pounds were terminated. This brought the dehydrated vegetable terminations to a total of of 81,536,000 pounds. These are distributed as follows:

Potatoes, 62,640,000 lb.; sweet potatoes, 12,005,000 lb.; beets, 404,000 lb.; onions, 4,883,000 lb.; carrots, 1,604,000 lb.

The Quartermaster General's office terminated all contracts for combat rations and individual components in August.

Contracts for 2,708,000 lbs. of frozen whole eggs were cancelled. These were intended for use in the 10-in-1 ration.

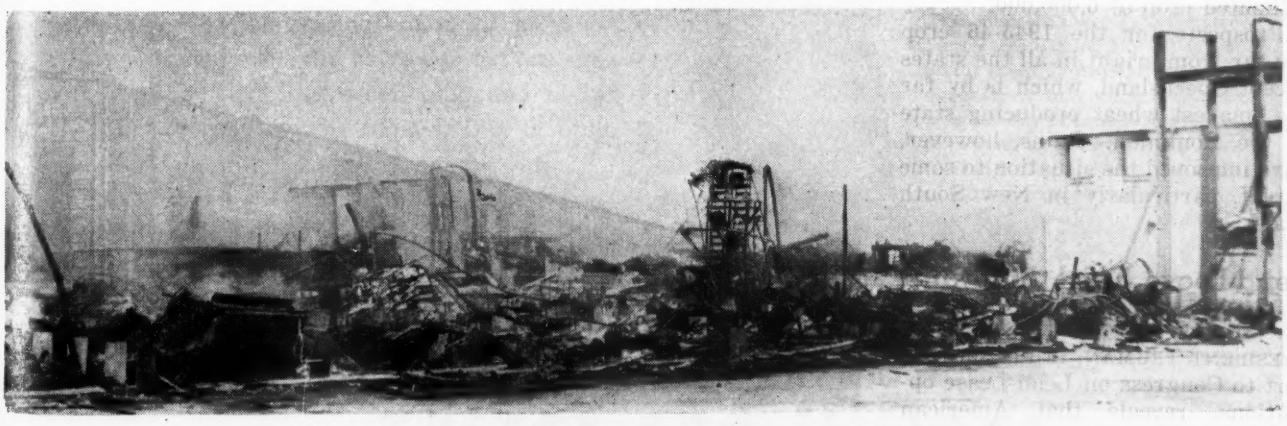
Contracts for 1,500,000 lbs. of various spices and sauces and for more than 6,000,000 lbs. of salt were cancelled. Among the spices were sage, type 2, ground ginger, cinnamon, ground mustard, type 2, ground paprika, kitchen sauce concentrate, table sauce concentrate, and nutmeg. Contracts for dry yeast amounting to 4,665,000 lbs. were terminated in early September. This yeast is of the type used for overseas supply and was scheduled for delivery in the current year.

The Army also announced the first week in September that contracts for 10,537,138 lbs. of dried whole eggs would not be continued. Delivery of 13,000,000 lbs. more was expected to be cancelled in September.

The effect of the sharp cutback in the egg procurement program was of such proportions that the egg market began to sag. Immediate result was an announcement by the Department of Agriculture that any frozen egg supplies declared to be surplus property, due to the cancellation of Army's dried egg contracts, would be disposed of in an orderly manner. USDA estimates the number of frozen eggs, held as a backlog by the egg driers, to be between 75 and 100,000,000 lb. Since there is need for this type of food abroad, the department explained that "if negotiations presently underway are concluded successfully, this will result in exporting all or a very substantial quantity of frozen eggs, which may not be needed by the armed forces or the civilian trade."

Contracts for approximately 4,000,000 lbs. of synthetic lemon juice powder, which was used mainly in combat rations, were also ended, as were contracts for 803,000 lbs. of vegetable salad oils scheduled for September delivery.

Quartermaster Corps contracts for nearly 9,000,000 lbs. of rolled oats and nearly 5,000,000 lbs. of uncut wheat and wholewheat breakfast cereals were cut. Announcement was also made that the Army would use nearly 750,000 lbs. less corn starch.



**CITRUS PLANT DESTROYED**

**This is a general view of the destruction wrought by the recent fire at the Citrus Concentrates plant, Dunedin, Fla. The plant, which the company leased from the government, with an option to buy, was fully covered by insurance and plans for immediate rebuilding are already in progress, according to B. C. Skinner, company president, who estimated the loss at more than $2,000,000.**

*Wide World*

**FIG TREES IN CHICAGO**

**This group of fig trees was started from a single branch six years ago, in Chicago. They were nursed along in the back yard of Vincent Toscano, in an experiment that proved they could be developed in a climate where the winters are cold.**

## Australian Wheat Crop Down Over 60 Percent

REPORTS from Australia reveal that this year's wheat crop harvest was less than 30 percent of the normal yield. The largest wheat producing state, New South Wales, produced approximately 18,000,000 bu. out of a normal crop of 54,000,000 bu. This crop was stripped from 1,700,000 acres, all that remained of a sowing of 3,000,000 acres. In the southern state of Victoria, 4,000,000 bu. were stripped, the normal being about 30,000,000. The South Australian yield was 9,000,000 bu. out of a normal of 30,000,000. Western Australia and Queensland fared a little better, the former producing 15,000,000 bu. compared with a normal of 25,000,000, and the latter yielding 5,000,000 bu. from an early estimated crop of 6,000,000.

Prospects for the 1945-46 crop are far from bright in all the states except Queensland, which is by far the smallest wheat producing state in the Dominion. Rains, however, have improved the situation to some extent, particularly in New South Wales.

## Lend-Lease Food Aid Exceeds 5 Billions

PRESIDENT TRUMAN, in his 20th report to Congress on Lend-Lease operations, reveals that American shipments of food to her fighting allies since March, 1941, have topped the $5,000,000,000 mark. The total of agricultural products shipped abroad under Lend-Lease, up to July 1, amounted to $5,906,466,000, of which $5,095,000,000 was in foodstuffs. The United States received in reverse Lend-Lease, up to April 1, $422,231,000 in foodstuffs and $165,696,000 in food and raw materials shipped to this country. The total of Lend-Lease aid of all kinds extended to our allies up to July 1 amounted to $42,020,779,000, of which agricultural products accounted for 14.1 percent.

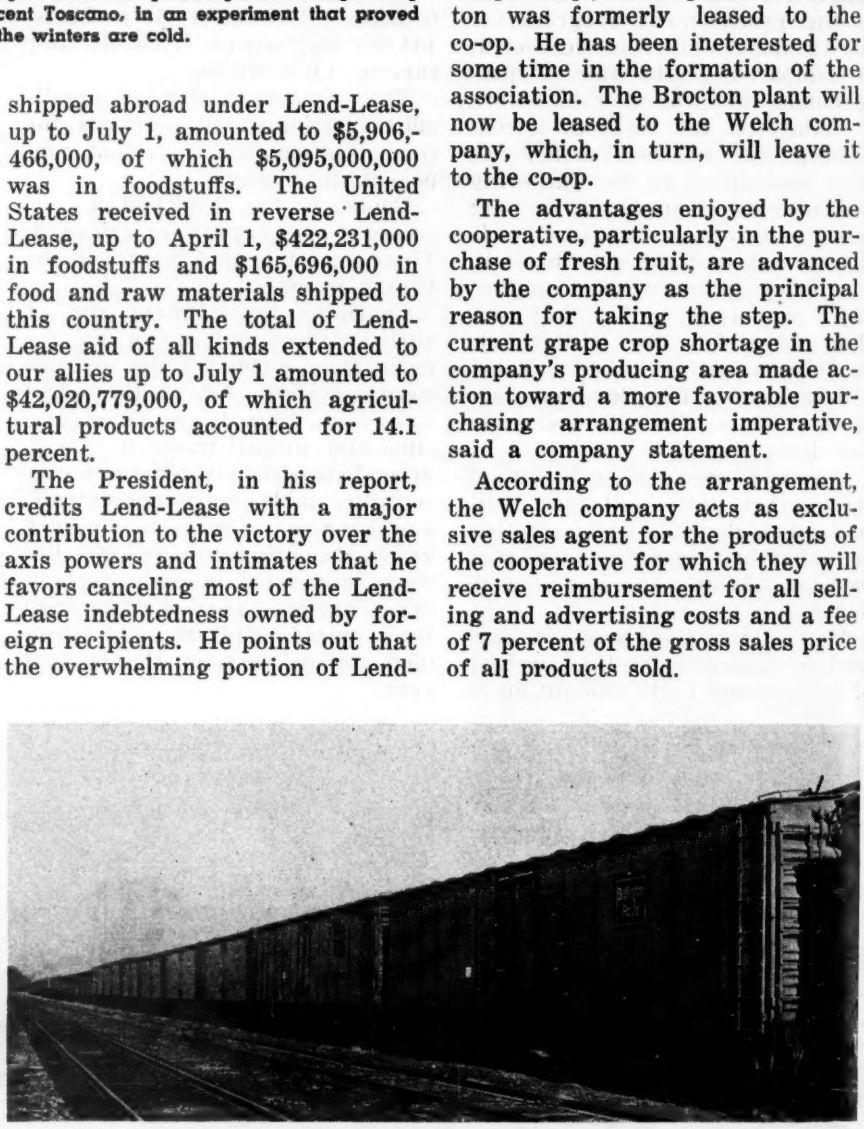
The President, in his report, credits Lend-Lease with a major contribution to the victory over the axis powers and intimates that he favors canceling most of the Lend-Lease indebtedness owned by foreign recipients. He points out that the overwhelming portion of Lend-Lease aid has been consumed by our allies in the war and, referring to the $42,000,000,000 indebtedness, says "it would have a disastrous effect upon our trade with the United Nations and hence upon production and employment at home" if such a huge debt were added to already-burdened nations.

## Welch Plants Leased To Grape Cooperative

THE transaction whereby the Welch Grape Juice Co., Westfield, N. Y., leases its plants to the National Grape Co-operative Association was completed during September, when J. M. Kaplan, New York financier, was elected president of the company, succeeding Paul R. Welch, who becomes chairman of the board. Mr. Kaplan controls the National Grape Corp., whose plant at Brockton was formerly leased to the co-op. He has been ineterested for some time in the formation of the association. The Brocton plant will now be leased to the Welch company, which, in turn, will leave it to the co-op.

The advantages enjoyed by the cooperative, particularly in the purchase of fresh fruit, are advanced by the company as the principal reason for taking the step. The current grape crop shortage in the company's producing area made action toward a more favorable purchasing arrangement imperative, said a company statement.

According to the arrangement, the Welch company acts as exclusive sales agent for the products of the cooperative for which they will receive reimbursement for all selling and advertising costs and a fee of 7 percent of the gross sales price of all products sold.



**STUDY "REEFER" EFFICIENCY**

**These eight refrigerator cars were recently tested for coast to coast shipments of frozen foods. Varying in construction and methods of temperature maintenance, the cars were checked at various points along the way in an exhaustive study.** **(See page 126.)**

# WALWORTH LUBRICATED PLUG VALVES

## offer these advantages

- . . . Direct port opening
- . . . Quarter turn opens or closes valve
- . . . Dead tight shut-off
- . . . Freedom from attack by fluids being handled
- . . . Pressure sealed
- . . . Made in a complete line. Sizes from ½" to 24" for pressures from 125 to 5,000 psi., and for vacuum requirements

THESE are just a few of the reasons why Walworth Lubricated Plug Valves give "top" performance on many *difficult* services.

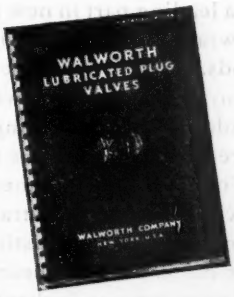
All Walworth Lubricated Plug Valves employ special insoluble lubricants which protect the plug and body against contact with the line fluid, thus combatting erosion and corrosion.

The lapped surfaces of the valve are "pressure sealed" when the valve is in either the open or closed position. By turning the lubricant screw, lubricant is forced under high pressure through a grooving system that completely encircles the parts as well as the top and bottom of the plug.

The lubricant seals the valve against leakage, and reduces friction between plug and body. This permits easy, quick, full-opening, or tight shut-off with only a quarter turn of the plug.

Fig. 1700 (illustrated) is a Steeliron valve, wrench operated, designed for a working pressure of 200 pounds WOG (water, oil, or gas). Valves are available in either screwed or flange types. Screwed type have API line pipe thread lengths. Flanged type are faced and drilled to American Standard for 125-pound cast iron flanges unless otherwise specified.

For further information about Fig. 1700, as well as the complete line of Walworth Lubricated Plug Valves write for Catalog No. 44L.




**SEND FOR THIS FREE CATALOG**

This new Walworth Lubricated Plug Valve Catalog No. 44L is just off the press. It gives prices, sizes, dimensions, and other pertinent data on this comprehensive line. A request on your company's letterhead will bring you a free copy of this informative catalog.

ARMY NAVY E

14 AWARDS TO 4 PLANTS

**WALWORTH**

**valves and fittings**

**60 EAST 42nd STREET, NEW YORK 17, N. Y.**

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

# Self-service Markets demand *Self-selling Packages*

More and more goods are going into American homes via the self-service market. And here, you will agree, the package must do a real selling job.

Flanked by competing products, unaided by any personal sales effort, the package must catch the eye, arrest the interest, and finally *clinch the sale by the message it conveys.*

The air of superior quality that a fine-looking package possesses makes many a sale . . . So does a wrap that enables the buyer to see the goods and appraise their quality . . . Cartons with extra protective wraps have an equally strong appeal—for housewives know from experience that such packages keep goods fresher and in better condition.

We are here to help you obtain a package keyed to modern selling trends. We have taken a leading part in new developments ever since wrapping machines first replaced hand methods. Today we serve more companies than any other maker of wrapping machines.

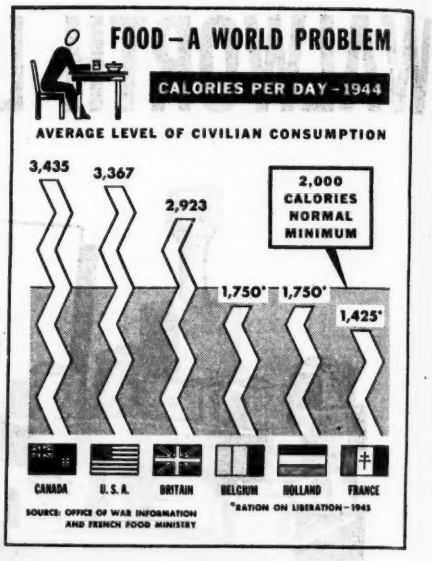
In addition to improving your package, it is more than likely that we can also *lower your costs.* For the same machines that produce better packages have the extra speed and overall efficiency that make drastic savings possible.

Why not call on our nearest office for a survey of your present packaging methods?

*Write for our booklet "Sales Winning Packages"*

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts
30 Church St., New York 7 • 111 W. Washington St., Chicago 2
101 W. Prospect Ave., Cleveland 15 • 443 S. San Pedro St., Los Angeles 13
18 Dickens Ave., Toronto 8

**PACKAGE MACHINERY COMPANY**
Over a Quarter Billion Packages per day are wrapped on our Machines


**FOOD CONSUMPTION**

**This graph shows why food looms so large in the world picture. The consumption for Belgium, Holland and France represents the amount that was being rationed at the time these countries were liberated. France, in particular, was far short of the 2000 calories estimated as a normal minimum.**

The deal marks one of the first moves by an old line processing company to join forces with a co-operative in what the National Tax Equity Association describes as a postwar trend toward co-op control of the majority of business in the processing and distribution of farm products.

## Survey Shows Extent Of Bakery Curtailment

UNDER the impact of third quarter reductions in sugar and fat allotments, retail bakers have been forced into drastic curtailment of production, store hours, and work week, according to the results of a national survey just completed by the Associated Retail Bakers of America.

Permanent closings were not alarmingly high with the exception of the New York area, from which 100 were reported. Approximately 50 percent of the bakeries were reported as being closed for one or two weeks and about 20 percent for more than two weeks. Most bakeries, and in some areas all bakeries, were reported as having reduced their store hours and days operated per week. Store hour reductions ranged from two to five hours per day and weekly operations from one to three days per week.

Many of the associations co-operating in the survey stated that their members reported increasingly heavy consumer complaints about

ONE OF 13 DOW CHEMICALS USED BY THE FOOD INDUSTRY

# Fall—Peak of the Year for fumigation

Cold weather drives insects and rodents indoors . . keeps them from doing much traveling during the winter months. Catch your unwelcome guests with a *thorough* fall fumigation! Kill them all, and you minimize chances of reinfestation this winter.

In the hands of a competent fumigator, Dow Methyl Bromide assures a complete kill of pests in your mill, warehouse, or food processing plant. Unmatched for penetrating power, it searches out every hiding place. Tests show that it even strikes to the center of 140-pound bags of flour stacked in large piles.

Dow Methyl Bromide works quickly, too, eliminating long, costly shutdowns. It is highly toxic to rodents and to insects in all stages of development, but harmless to most food products when properly used.

Investigate now . . . see how efficiently Dow Methyl Bromide will handle *your* fall fumigation!

**THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN**

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago
St. Louis • Houston • San Francisco • Los Angeles • Seattle

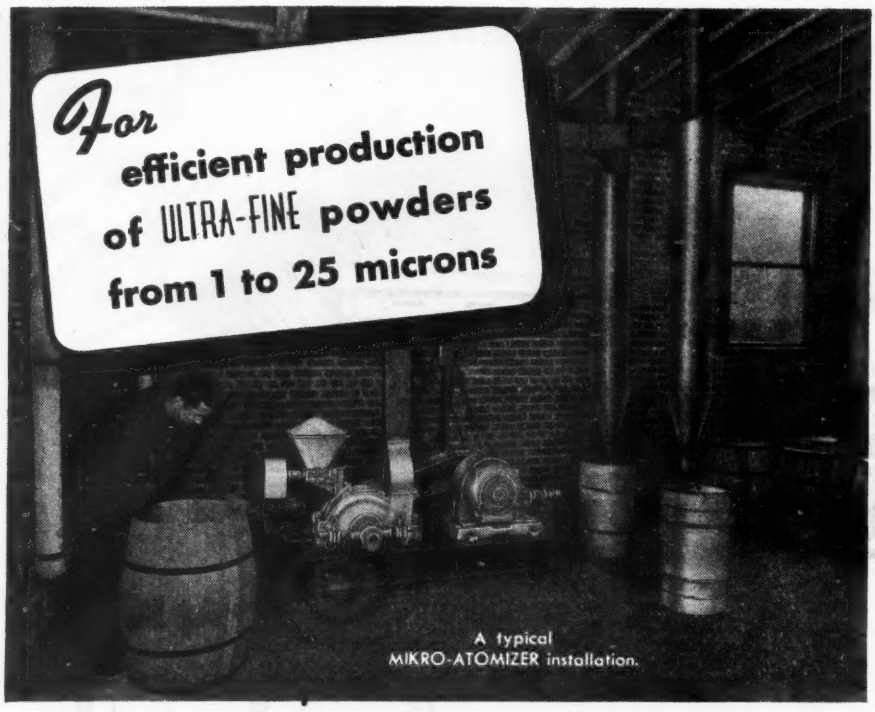
*The penetrating fumigant*

# Methyl Bromide

Write for information on the simple screened box test to determine the effectiveness of your fumigations.

DOW

CHEMICALS
INDISPENSABLE TO INDUSTRY

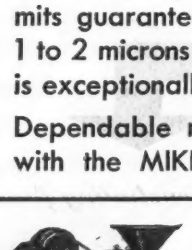


A typical MIKRO-ATOMIZER installation.

THE new MIKRO-ATOMIZER provides mechanical, screenless pulverizing for the efficient production of ultra-fine powders in the low micron ranges.

Compact and highly efficient, the MIKRO-ATOMIZER has been developed to produce powders of a fineness that permits guaranteed performance with particle sizes as low as 1 to 2 microns on certain materials. In addition, the operation is exceptionally cool.

Dependable mechanical control of particle size is assured with the MIKRO-ATOMIZER. An entirely new principle in grinding is employed involving the imparting of a centrifugal force to each particle and opposing that force with an aerodynamic drag. This principle is applied in combination with and as an integral part of the grinding action.



**MIKRO-PULVERIZER**
For over 20 years the leader in producing fine grinds of a large variety of materials.

To arrange for a test grind of your material in a MIKRO-ATOMIZER, send for a copy of Confidential Test Grinding Data Sheet and new MIKRO-ATOMIZER Bulletin.

By Invitation Member
WARRANT of QUALITY

**PULVERIZING MACHINERY COMPANY**
97 CHATHAM ROAD • SUMMIT, N. J.

NOW . . . 2 TYPES TO MEET MOST PROCESS JOBS

MIKRO-PULVERIZER (FINE)
MIKRO-ATOMIZER (ULTRA FINE)
Reg. U. S. Pat. Off.

*Wide World*

**SMALL TRACTOR**

**This six-horsepower tractor runs eight hours on two gallons of gasoline and will sell for about $300, if and when Frank W. Stratton, its designer and builder, succeeds in organizing a company to manufacture it. Here Mr. Stratton is shown in the driver's seat at his shop in Tulsa, Okla.**

exhausted stocks. The results of the survey are based upon findings covering more than 5,000 retail bakeries in all parts of the country.

A complete tabulation of the survey was filed with the OPA and the Department of Agriculture for their consideration.

## ODT Convention Ban Lifted October 1

THE ODT ban on conventions, group meetings and trade shows has been removed, effective October 1, it has been announced by Col. J. Monroe Johnson, ODT chairman.

At the same time Colonel Johnson said that the lifting of the ban was not an invitation to travel, nor can it be considered an assurance that transportation capacity will be available. He asked sponsors of these gatherings to defer meetings whenever possible and to keep necessary meetings small until after the peak of the troop movement, which will come early next year.

## FAO to Organize at Meeting in Canada

THE Food and Agriculture Organization will formally organize a subsidiary agency of the United Nations Organizations, in meetings scheduled to begin at Toronto, Canada, October 16. United States adherence to this international body was authorized by Congress at the end of July. Approximately two-thirds of the 45

"Trifles make perfection but perfection is no trifle"

# NO "HOT SPOT" ON THIS KENNEDY HANDWHEEL

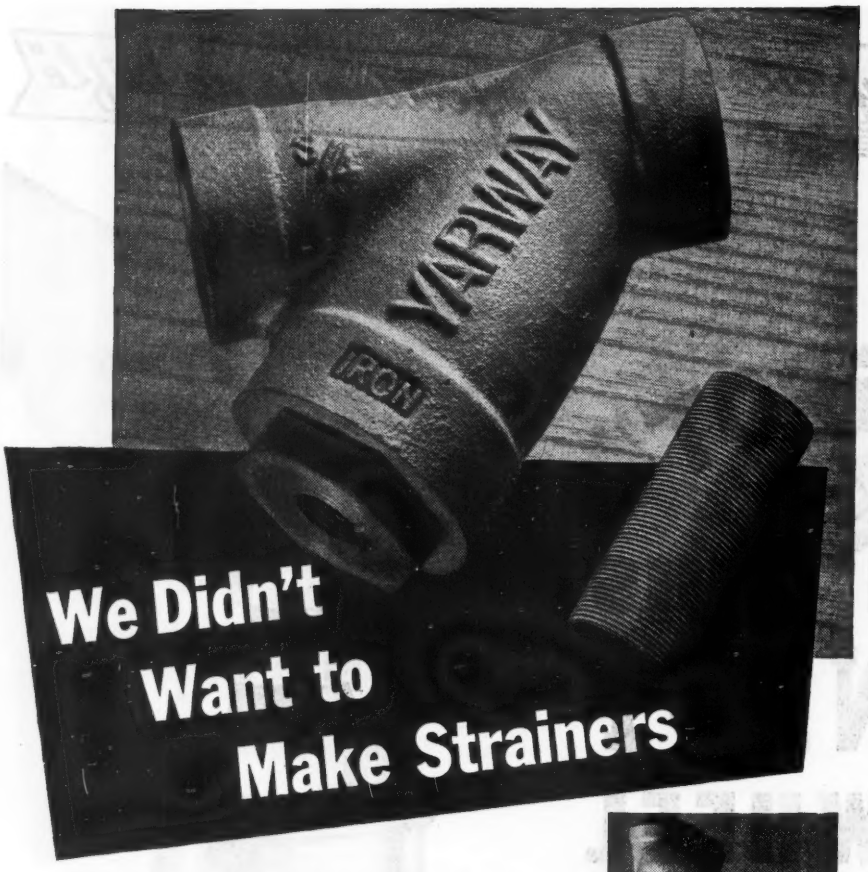
You never need fear burned hands when you grasp this Kennedy malleable iron non-heating handwheel with wheel nut lower than the top. We have designed it to have the maximum possible heat radiating surface, and at the same time to provide non-slip grip. You'll find this Kennedy detail mighty helpful when you want to operate a valve in a hurry on steam service. This handwheel is used on most Kennedy Bronze Valves; and similarly careful attention has been given to making all other Kennedy Handwheels assure a firm, comfortable grip with ample leverage.

Not a vitally important point in valve design, but it is just one of many indications that from top to bottom, we have exerted every effort to make Kennedy Valves the kind you want to standardize on.

One of a series of advertisements explaining how Kennedy gives careful attention to the details of valve design, construction and workmanship that provide maximum effectiveness, convenience, and length of service.

THE KENNEDY VALVE MFG. CO.
ELMIRA • NEW YORK

KENNEDY valves... pipe fittings... fire hydrants




# We Didn't Want to Make Strainers

BUT we needed them for use with Yarway Steam Equipment and couldn't find any to suit us.

So we designed the *YARWAY Strainer.*

Apparently a lot of other people were having "Strainer trouble" because, without a line of advertising, the Yarway Strainers *purchased* in a few years now number *many thousands.*

Why don't you look into this better Strainer for your money? Buy one from your supply house (over 100 Mill Supply Houses now have them).

See its protection against corrosion—*cadmium plating inside and out.*

Examine its *high grade Monel woven wire screen* that stops dirt—lets condensate or other fluids flow freely.

Notice the removeable blow-off bushing. Screen and bushing come out together—go back together, *automatically aligning.*

Six standard sizes from ½" to 2" for pressures to 600 lb.

*See your Mill Supply House or write for Bulletin S-200*

YARNALL-WARING COMPANY
127 MERMAID AVE. PHILADELPHIA 18, PA.

YARWAY STRAINERS

*Wide World*

**PRE-SALTED CELERY**

**Nick Engel, a Wisconsin farmer, claims to have raised pre-salted celery by the simple expedient of mixing salt with the soil, while planting. He has 25,000 celery plants ready for harvesting and says the stalks have a very definite saltine flavor. The celery must be tested chemically, however, according to the University of Wisconsin, before reaching any definite conclusions.**

governments, which originally signed the preliminary organization plan, have voted formal adherence.

Proceedings for the meeting are under the chairmanship of a representative of the host government, Canada. The executive secretary of the Interim Commission, which is making arrangements for the gathering, is Gove Hambidge, formerly with the U. S. Department of Agriculture, now maintaining headquarters in Washington.

## Return Milk Bottle Campaign Prepared

A PRACTICAL milk bottle return program any dairy or group of dairies can utilize easily and inexpensively to meet emergency milk bottle shortages has been arranged in handy kit form by the Owens-Illinois Glass Company of Toledo, Ohio, and is being distributed free to dairymen upon request.

The campaign includes complete plans for organizing a milk bottle roundup program, together with detailed suggestions on how to obtain maximum effectiveness. The program material includes newspaper advertising mats, newspaper publicity stories, new photographs, spot radio announcements, news broadcasts and direct appeals to consumers.

*Artist:* Peter Sekaer, native of Denmark

**FREED FLAG.** Denmark rebuilds—aided by shipments in paperboard. Meanwhile, our laboratory experts continue their constant research to make available for peacetime needs the new and advanced packaging techniques developed to meet the demands of war.

***CONTAINER CORPORATION OF AMERICA***

CHICAGO AND 22 OTHER CITIES

***SAVE WASTE PAPER***

# MANPOWER
## *is what you make it*

Who can say what one man can do—with *responsive* machines to aid him? More! Yes, a *lot* more, but how *much* is a variable quantity. Only machines that are *right for the work* give production the *boost* that you need.

Efficiency was never so *important* as it is today, and is bound to be, *tomorrow.* America's food industries must help keep the world on its feet. It's a job that calls for *speed*—for everything that *fitness for the task* requires—for "lifts" that save minutes and muscle day-after-day, week-after-week, month-after-month. And when it comes to handling heavy loads, there's nothing like Robbins & Myers electric hoists for *speed* and *operating ease.*

### SOLVING THE HELP PROBLEM

Once you've used these handy hoists, you'd never have it any other way. They help solve the help problem by *helping* new workers do better work—by *helping* experienced workers do more work—*helping* in every department from receiving room to loading dock, with their effortless aid to *orderly routine.*

R & M electric hoists put movement on a *business basis.* We'll be glad to show you how this speedy equipment *gets* the most out of manpower by *giving* manpower the most. Sales and Service Headquarters blanket the nation. Write, *right away,* for the facts.

### *Take It Up with* R & M

Hundreds of standard models, the right hoist for every job, and the know-how of long experience, have made Robbins & Myers *first in the food field* for more than 10 years.

R & M types and models range all the way from hand chain hoists to overhead electric cranes.

**ROBBINS & MYERS • INC.**
HOIST & CRANE DIVISION • SPRINGFIELD, OHIO
In Canada: Robbins & Myers Co. of Canada, Ltd., Brantford, Ont.
MOTORS · MACHINE DRIVES · FANS · MOYNO PUMPS · FOUNDED 1878


**DISTRIBUTION**

## Long Haul Rail Tests Given to Frozen Food

REFRIGERATOR CARS of varying construction and methods of maintaining protective temperatures for packaged frozen foods were given a transcontinental test, during the period of August 15-29.

In all, eight cars were subjected to the test which began with loading points in Washington, on the Pacific Coast, and ended at Chicago, Jersey City, Philadelphia, and Boston destinations. The cars were loaded with quick-frozen fruits and vegetables, such as sweetened raspberries in 20-lb. capacity bleached manila cylindrical containers encased in corrugated paper shipping cases, and peas in 2-lb. cellophane wrapped rectangular cartons packed in corrugated paper shipping cases.

Two of the cars were Burlington Route giant superinsulated end bunker refrigerators with steel sides with a 50-ft. overall exterior length and a 42-ft. 6-in. net inside length.

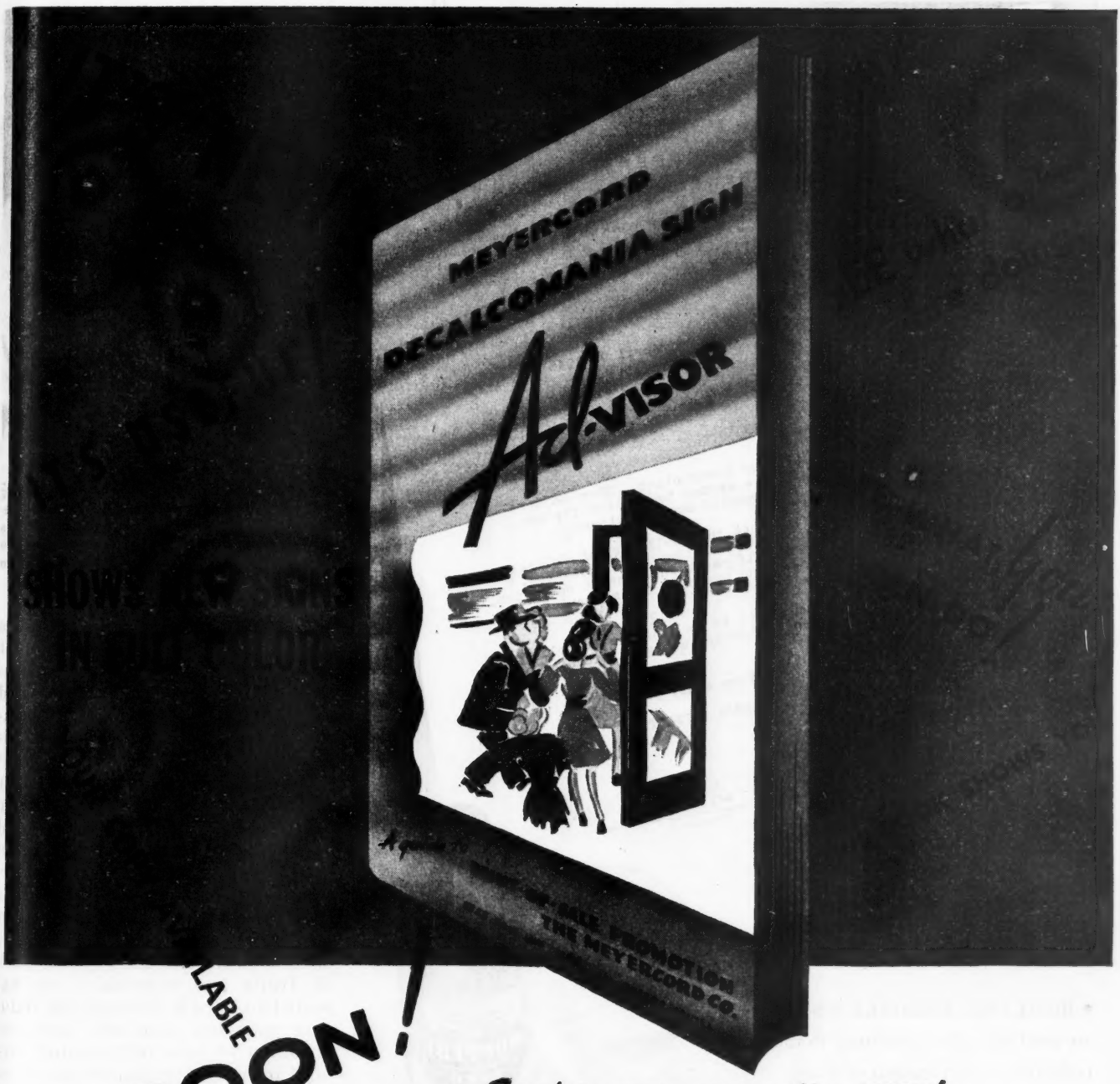
Two cars were Burlington Route standard 40-ft. end bunker refrigerators with tongue-and-groove lumber sides equipped with air-circulating fans and wall racks with 13/16-in. air-space between wall racks and inside wall of cars to permit free circulation of cold air.

Two cars were Burlington Route standard 40-ft. end bunker cars with tongue-and-groove lumber sides equipped in air-circulating fans and 13/16-in. side wall ducts to permit free circulation of cold air.

The two remaining cars were Fruit Growers Express Co. new giant (50-ft.) superinsulated over-head brine-tank refrigerators with 5/8-in. plywood sides.

All cars had steel ends and standard floor racks. Both the end and over-head bunkers were charged with 100 lb. of ice and 30 lb. of salt mixture to give a brine temperature of –6 deg. F.

The tests were carried out under the supervision of the U. S. Department of Agriculture and temperature readings were taken at time of loading, enroute at icing stations and at destination just prior to opening of cars for unloading. Thermocouples were located at eight different places in each car and in cartons of the frozen foods to determine changes in both air- and product-temperatures during the elapsed-time periods.




LABLE

# SOON!

***Send in your reservation* NOW!**

Advertisers! . . . Agencies! . . . Merchandising men! This new, full color Decalcomania Sign Ad-Visor is packed with suggestions for dealer and product promotion and identification! A limited number will be ready for distribution early in October. Brochure shows where, when and how to use Decal point-of sale signs, suggests unusual designs and treatment. Cash in on "sidewalk circulation" and "store-traffic" sales possibilities with colorful, lasting, low cost Meyercord Decals! Reserve your Sign Ad-Visor today. Address Dept. 65-10.

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• IDENTIFY
• DECORATE
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FREDERICK M. LINDER
TREASURER

Buell Engineering Co., Inc.
70 Pine Street
New York, N. Y.

April 9, 1945

Gentlemen:

Seven years ago we built our power plant. When we were considering the installation of a system to collect fly ash, our engineering department recommended Buell equipment.

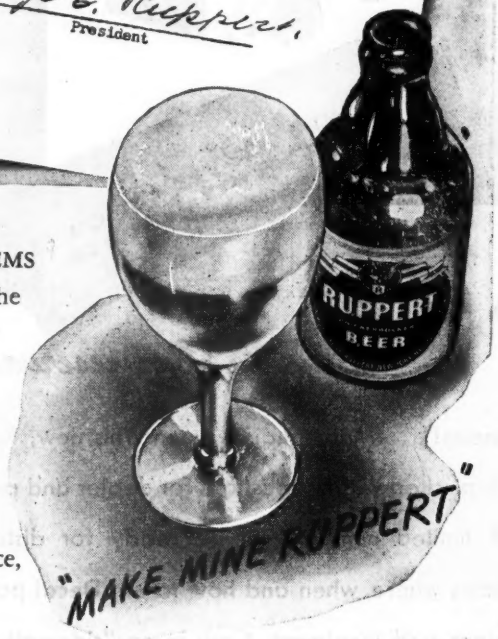
We are now pleased to say that the Buell Fly Ash Collectors have efficiently done the job for which they were installed. Moreover, during the six and a half years in constant operation, it has not been necessary to expend one cent for mechanical maintenance or repairs.

In view of this performance, it is my pleasure to tell you that we consider Buell Fly Ash Collectors a highly satisfactory plant investment.

Very truly yours,
JACOB RUPPERT

GER: H

George E. Ruppert
President




• BUELL DUST RECOVERY SYSTEMS are used throughout industry in the collection or reclamation of many kinds of dust, in numerous production and process operations.
Hundreds of satisfied industrial users will attest to Buell's—
"High Efficiency, Low Maintenance, Long Life."

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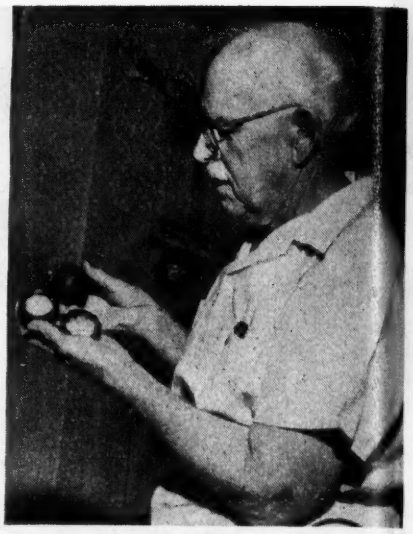
DUST RECOVERY SYSTEMS

BUELL ENGINEERING COMPANY, INC.
Suite 5000, 8 Cedar Street, New York 5, N. Y.
*Sales Representatives in Principal Cities*

*DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"*

**NEW FRUIT**

**David Fairchild, Miami, Fla., is shown here holding two mangosteens, the fruit he recently introduced into this country. That's all the original caption, accompanying the picture, reveals, but a close relationship to the mango is suspected.**

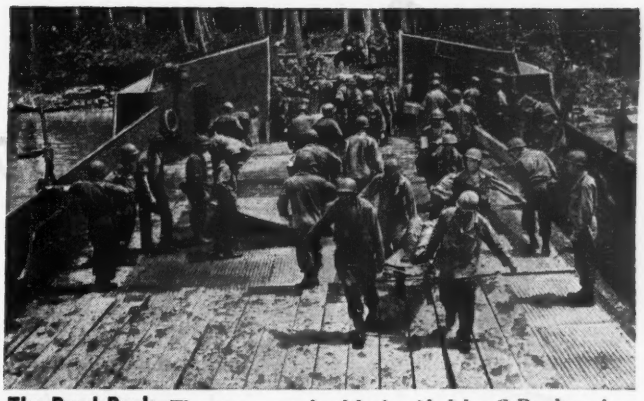
This test run of some 3,000 miles with approximately 500,000 lb. of frozen foods is part of a cooperative effort between the United Fresh Fruit and Vegetable Association and the Association of American Railroads to determine what types and sizes of refrigerator car are most suitable for the protective transportation of fresh fruits and vegetables whether they be frozen or not frozen and whether winter, summer or between-season weather conditions prevail. The findings of the various test runs made under different varieties and types of pack of fruits and vegetables are expected to have a determining influence upon the type, size, and construction of new refrigerator cars built to replace or supplement existing over-age or numerically inadequate cars now in use.

A subsequent report will be made on the findings of these tests.

## All Cheese Controls Are Lifted by USDA

THE U. S. Department of Agriculture today removed all cheese controls following advices from the U. S. Army Quartermaster Corps that some military stocks of Cheddar cheese can be used to fulfill requirements of foreign claimants. These actions were accomplished by removal of the previously announced 40 percent Cheddar cheese set-aside for September under Amendment 5 to War Food Order 15, and termination of War Food Order 92, which restricted the manufacture of foreign type

**Clearing the Way!** Glycerine will help produce the vast quantities of explosives needed for postwar harbor clearance, building and rebuilding. One of the great reasons glycerine is used in making dynamite is that it doesn't separate from other materials.



**The Road Back.** The return to health is aided by C.P. glycerine, an important component in the making of many pharmaceuticals. Glycerine, the versatile solvent, humectant, carrier, has been proved safe in pharmaceuticals through generations of use.

**Tough Job!** Long-lasting modern paints for war equipment, and for widespread industrial and home use, are made with an alkyd resin base. Glycerine is important in the making of these resins.

# Why Glycerine is Superior in ALKYD RESIN MANUFACTURE

### Glycerine is—

*Efficient.* All three of the hydroxyl groups are reactive, yet reaction in the resin kettle is controllable. Glycerine-derived alkyds set to hard films, and have a low acid number.

*High-boiling.* It stays in the kettle.

*Pure.* When you buy glycerine, you aren't buying a mixture of polyhydroxy materials, or unwanted impurities — you buy just glycerine.

### Glycerine has—

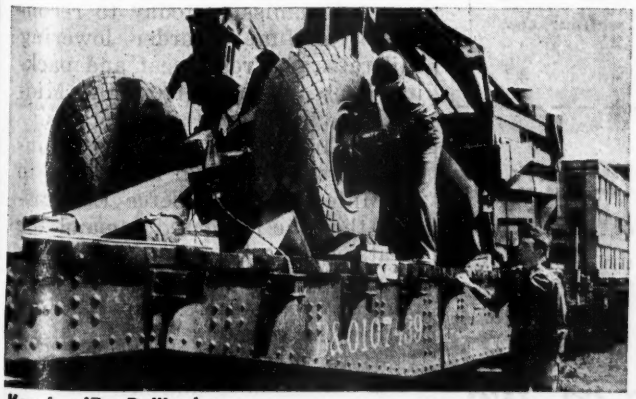
*Complete availability of hydroxyl groups.* No internal dehydration at ordinary kettle temperatures. You get full value with glycerine.

*A long record of service to the resin industry.* High utility, low price, unique properties.

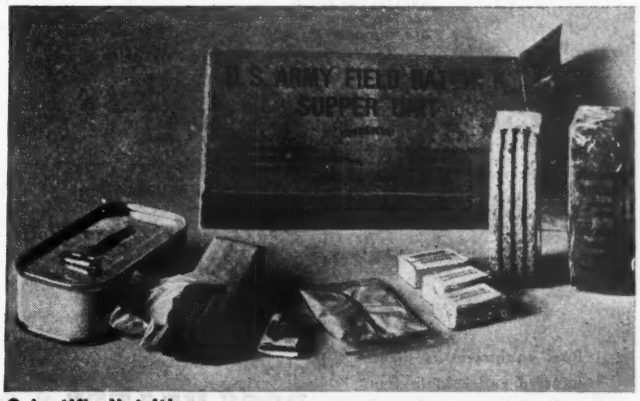
Glycerine is valuable not only in the making of alkyd resins, but in hundreds of other products. Its high viscosity, high solvent power, compatibility, nontoxicity, permanence, and other advantages make it a superior humectant, plasticizer, solvent, preservative, lubricant, hydraulic fluid, and component in many essential materials.

**GLYCERINE PRODUCERS' ASSOCIATION**

**295 Madison Avenue, New York 17, N. Y., Research Laboratories, Chicago, Ill.**



**Keeping 'Em Rolling!** Glycerine is used in the processing of synthetic and natural rubber goods and many other important war materials. You, too, can use glycerine in your products!



**Scientific Nutrition.** Many foods, food products, and food-packaging materials call for the use of C.P. glycerine — which is a natural product — and a food itself. Use wholesome *glycerine!*

ROSS
HEAT EXCHANGE EQUIPMENT

# ...THE LID'S OFF!

To the many industries compelled to hold off on replacement, improvement and expansion of equipment until the War's end, the *lifting of priorities* on Ross coolers, heaters, heat exchangers and condensers is welcome news.

Fulfillment of Ross' gigantic program for the Navy, Maritime Commission, Army and Lend-Lease not only opens the doors to large-scale, peacetime fabrication of all types of heat exchange equipment, but offers to Ross users (old and new) numerous benefits from new skills, methods, equipment and plant expansion directly attributable to war production.

Even though you may have been thoroughly familiar with Ross products before the war, changing conditions and requirements make it advisable for you to consult Ross engineers before specifying. At your suggestion, a representative from a Ross office in your locality will gladly discuss your requirements with you and make recommendations based on sound engineering principles.

**BULLETIN 5322**
*Type "CP" and "CF" Coolers for oil, water and other fluids in larger quantities.*

**BULLETIN 4922**
*Type "BCF" Coolers for oil, water and other fluids in smaller quantities.*

**MANUAL 4017**
*Surface Condensers, standard, all-welded steel construction.*

**BULLETIN 3624-A**
*Type "O" Heaters or Type "TS" Tank Suction Heaters for fuel oil and other heavy viscous fluids.*

**BULLETIN 3623-A**
*Type "IS" Instantaneous Heaters for water and other fluids.*

Also, now is the time to bring your equipment files up-to-date by mailing the attached coupon, without cost or obligation.

ROSS HEATER & MFG. CO., INC.

Gentlemen:
The following bulletins which we have circled are those we would like for our files:

5322 4922 4017 3624-A 3623-A

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY, STATE & ZONE .....

Ross equipment is manufactured and sold in Canada by Horton Steel Works, Ltd., Fort Erie, Ontario.

**ROSS HEATER & MFG. CO., INC.**
Division of American Radiator & Standard Sanitary Corporation
1443 WEST AVENUE BUFFALO 13, N. Y.


cheeses to permit greater volume of manufacture of Cheddar cheese. Both actions are retroactive to September 1.

Coincident with this announcement, Chester Bowles, administrator, also announced that the point value of all varieties of cheese were reduced to zero, effective September 12.

## Food Plant Awards To Be Discontinued

THE Achievement "A" program will be terminated as of September 15, according to the Department of Agriculture, after two years in which the award was made to 422 food plants. In recognition of individual achievement, more than 236,000 workers in these plants have been awarded "A" pins. While no nominations were accepted after September 15, a considerable number for the original and second year "Star" awards remained pending. Of these the following were announced early in September:

"Star" awards will go to:

Tilgham Packing Co., Tilgham, Md.; California Packing Corp., Plant 148, East Pembroke Canning Corp., East Pembroke, E. Greenebaum Co., New York, N. Y.; H. P. Cannon & Son, Bridgeville, Del.; Hungerford Packing Co., Hungerford, Pa.; Stokely Foods, Inc., Trenton, N. J.; Fox Valley Canning Co., Hortonville, West Salem Packing Co., West Salem, Wis.; General Foods Corp., Post Products Division, Battle Creek, Mich.; Stokely Foods, Inc., Lakeland, Minnesota Valley Canning Co., Montgomery, Minn.; John H. Dulany & Son, Exmore, Va.; California Packing Corp., Plant 101, Monterey, California Conserving Co., Pacific Packing Co., Oakdale, E. C. Couture, Dehydrator, Modesto, California Conserving Co., Hayward Kitchens, Hayward, Calif.

"A" awards will go to: Bernard S. Pincus Co., Philadelphia, Pa.; Hunter Packing Co., E. St. Louis, Ill.; Stokely Foods, Inc., Plant 53, Norwalk, Ohio; Escalon Packers, Inc., Escalon, Milk Producers Association of Central California, Modesto, Calif.; Edward Aaron Co., Fort Scott, Kan.

## Ask Reconsideration Of New Freight Rates

A GROUP of Pacific Coast organizations asked the Interstate Commerce Commission today to reconsider its June 5 order lowering rail rates on fresh meat and packing house products from the Midwest to Mountain-Pacific States.

The Oregon and Washington interveners asserted in a petition to the Interstate Commerce Commission that the increased demand for meats and packing house products on the Pacific Coast should be supplied by producers and packers within the territory.

"If the Pacific Coast territory is to be autonomous and self-sustaining and to enjoy a well-rounded commercial and industrial development, it must have basic industries

# VITAMIN A
## IN THE FORM OF CAROTENE

Now for the first time, all of the previous advantages of Carotene are available at new low prices comparable to other forms of Vitamin A activity.

Carotene is the International Standard for all Vitamin A activity and is the form of Vitamin A supplied by nature in fruits and vegetables. It assures you a total absence of fishy taste and smell. It provides golden yellow color in natural form and hence carries a special advantage when used to fortify certain types of products such as butter and margarine.

There is no doubt but that there is real opportunity to build consumer preference for products enriched with Carotene. American housewives are alert to nutritional values. Now is the time to win favor for your product by identifying it with Carotene.

## *Write For Information and Prices*

Write today for our further data and prices covering our three available potencies, 250,000, 50,000 and 3330 U.S.P. units of Vitamin A per gram. Carotene in Oil GBI is produced under carefully controlled conditions to assure guaranteed and uniform potency, high quality and stability.

*Full production for Peace provides large stocks for immediate delivery.*

GBI

**GENERAL BIOCHEMICALS, INC.**

DIVISION WYETH INCORPORATED

**50 LABORATORY PARK • CHAGRIN FALLS, OHIO**

**GOLDEN YELLOW CAROTENE . . . The Vitamin A**

Relied upon

BY VALVE MAINTENANCE MEN EVERYWHERE . . .

LUNKENHEIMER DISTRIBUTORS

RENDER A SERVICE THAT IS ESSENTIAL—A VITAL LINK IN THE CHAIN OF INDUSTRIAL PRODUCTION

Throughout the war, Lunkenheimer Distributors did a fine job in helping to maintain industrial valve installations at top efficiency.

Located in leading industrial centers, our Distributors have provided quick, readily accessible, and complete valve service throughout the nation.

In addition to supplying high quality, long life Lunkenheimer Valves, they have assisted maintenance men in the solution of both operating and maintenance problems.

This service isn't new...Lunkenheimer Distributors have been rendering it for many years in the past, and will continue doing so in the future. For this Distributor set-up is a basic, permanent part of the Lunkenheimer way—the *better service* way.

You can always depend on your nearby Lunkenheimer Distributor for expert, experienced aid in the solution of valve maintenance and operating problems. Call on him!

The Lunkenheimer Co., Cincinnati 14, Ohio, U. S. A. (Offices: New York 13, Chicago 6, Boston 10, Philadelphia 7. Export Department: 318-322 Hudson St., New York 13, N. Y.)

LUNKENHEIMER VALVES

BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S. P.
BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS


to provide employment for the people and to meet their needs and requirements in food, clothing and other provisions," the petition said, adding that livestock production and packing houses are among the area's most important industries.

## No Immediate Change In Packaging Seen

AMERICAN MANAGEMENT Association's Packaging Conference, in New York, on September 18 and 19, was marked by a tone of serious appraisal of wartime developments and current packaging possibilities. The story is familiar—there were new developments during the stress of war production but none that will make an immediate or radical change in civilian packaging.

Most manufacturers are now in need of new equipment, but new packaging machinery will continue for some time to be hard to get, according to C. A. Claus, of New Jersey Machine Co. Deliveries for standard machines are being scheduled in 6 months to 2 years, the major difficulties being supplies of fractional horsepower motors and grey iron castings. With few exceptions there have not been engineering staffs available to develop new designs, so the machines delivered will be of standard types. Streamlined, high speed special machines are for tomorrow, not today. Price increases of at least 10 percent are expected, because of increased labor and materials costs.

The program brought out no new materials not already thoroughly familiar to the industry, and improvements in materials handling, although outlined, must await availability of trained personnel.

## SCHEDULE OF EVENTS

OCTOBER

15-16—Boston Conference on Distribution, 17th meeting, Hotel Statler, Boston.
15-19—American Dietetic Association, 28th annual meeting, Netherlands Plaza Hotel, Cincinnati.
17—National Pickle Packers Association, eastern seaboard members, Hotel New Yorker, New York.
30-31—American Meat Institute, Hotel Stevens, Chicago.

NOVEMBER

7- 9—Grocery Manufacturers of America, annual meeting, Waldorf-Astoria Hotel, New York.
7- 9—American Oil Chemists Society, 19th fall meeting, Hotel La Salle, Chicago.
15-19—National Chemical Exposition and Industrial Chemical Conference, Coliseum, Chicago.
26-27—American Butter Institute, 37th annual meeting, Drake Hotel, Chicago.
26-27—Packaging Institute, annual meeting, Commodore Hotel, New York.

# You can protect even pectin from contamination ...with INCONEL* evaporators

Corrosion may occur in evaporators *... yet no one may be aware of it.*

Not, at any rate, before product flavor, color and purity have been affected.

As food processors know, pectin is highly sensitive to metallic contamination. Accordingly, evaporators used in concentrating pectin liquor require a material with better-than-average ability to withstand corrosive attack.

Inconel has this ability. In actual service . . . as well as in extensive laboratory and field corrosion tests . . . Inconel provides virtually complete protection against corrosion by organic acids in foods.

Because of its resistance even to hydrochloric acid conditions encountered in pectin processing, Inconel is recognized as an outstanding material of construction.

Additional properties of this strong, rustproof metal make it particularly suitable for many other types of equipment used in the handling, processing and storage of food products.

Inconel is resistant to wear and abrasion. Commonly used cleansing agents and detergents do not damage it. Moreover, Inconel possesses excellent fabricating and welding qualities, and makes possible the construction of extremely strong, durable and lasting equipment.

Technical Bulletin T-7 contains further information on the *Properties and Uses of Inconel.* Those interested in reducing metallic contamination of food products, including fruit juices and alcoholic beverages, will find it worthwhile to have a copy of this bulletin handy for reference. Write for it.

LONG TUBE VERTICAL evaporator used in concentrating pectin liquor. Designed and built by *Swenson Evaporator Division, Whiting Corp., Chicago,* the unit is constructed wholly of Inconel and Lukens Inconel-clad steel.

*Reg. U. S. Pat. Off.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK 5, N. Y.

INCONEL

# Winthrop

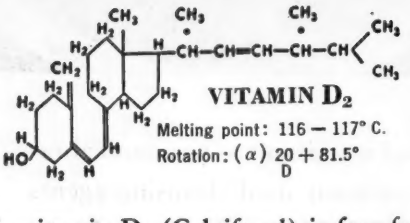
## CHEMICAL COMPANY, INC.

# Now Offers . . .

PURE CRYSTALLINE

Vitamin $D_2$

★ (CALCIFEROL)



VITAMIN $D_2$

Melting point: 116 — 117° C.

Rotation: $(\alpha)\ ^{20}_{D} + 81.5°$

Winthrop's synthetic vitamin $D_2$ (Calciferol) is free from lumisterol, toxisterol, suprasterol, and other by-products of irradiation. It never varies in antirachitic potency.

**OTHER WINTHROP PURE SYNTHETIC VITAMINS:**

- **TRIDEE**—Winthrop's Brand of vitamin $D_3$ in Corn Oil
- **VITAMIN $B_1$** (Thiamine Hydrochloride)
- **VITAMIN $B_2$** (Riboflavin)
- **NIACINAMIDE**
- **VITAMIN $B_6$** (Pyridoxine Hydrochloride)
- **CALCIUM PANTOTHENATE**
- **VITAMIN C** (Ascorbic Acid)
- **d-ISO-ASCORBIC ACID . . .**

**• AMINO-ACIDS:**
**Tryptophane**
**Phenylalanine**
**Methionine**

- **"B-E-T-S"**—Winthrop's Brand of Bread-Enrichment Tablets
- **"VEXTRAM"**—Winthrop's Brand of Flour-Enrichment Mixture

**POTENCIES AND PACKINGS:**

Crystalline form in vials of one five, and ten grams.

Solution in Corn Oil: 1,000,000 U.S.P. Units per gram* packed as follows:

400 Standard Units — 2,500 Standard Units
1,000 Standard Units — 50,000 Standard Units

Also Solution in Corn Oil: 400,000 U.S.P. Units per gram packed as follows:

250 Standard Units — 1,000 Standard Units
500 Standard Units — 20,000 Standard Units

*Standard Unit=1,000,000 U. S. P. Units

WINTHROP

*For prices and information address*
*Special Markets Division*
**WINTHROP CHEMICAL COMPANY, INC.**
**170 Varick Street, New York 13, N. Y.**
★ Sole Manufacturer under U.S. Patent 1,902,785 granted to Winthrop Chemical Company, Inc.


## WPB Ends Restrictions On Glass Containers

QUOTA restrictions on the use of glass containers have been lifted by WPB, even though the supply is not adequate to meet all demands fully. The agency said that the military requirements were too small to warrant the retaining of controls. The action was taken through an amendment to L-103-b.

As this order now stands, only tinplate closures remain under control. Restrictions on these closures will be necessary for an indefinite period, WPB said, as no easing in the available supply of tin is anticipated in the near future.

## PROCESSING

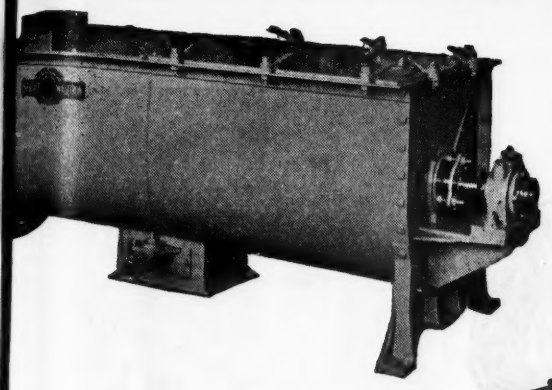
## Quick Aging of Beef Cuts Loss 9 Percent

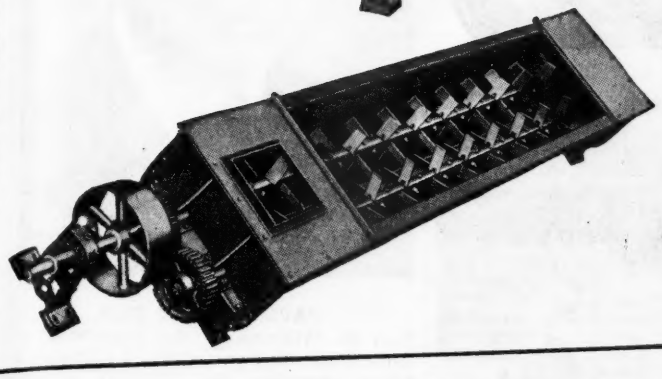
SAVINGS of more than 9 percent in shrink and trim losses for beef result when aging time is cut from the customary 21 days to a quick-age period of 8 days, according to results of tests recently released.

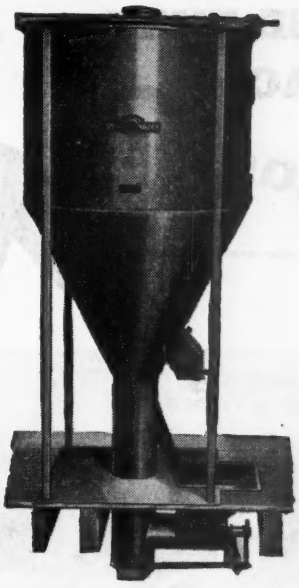
The tests were carried out on U. S. Choice, U. S. Good, and U. S. Commercial grades of beef and the announced savings are the findings from two company and one Army tests. Procedure used for the 21-day aging is that commonly practiced by meat packers for their hotel and high-grade restaurant trade and was carried out in the cooling room of a large Chicago meat packer. The quick-age procedure is that covered by U. S. Patent No. 2,314,301 licensed to Freezer Foods, Inc. That procedure involved controlled temperatures of 36 to 40 deg. F. and the relative humidities of 92 to 95 percent with a gentle convection flow of air in a specially designed aging compartment or rack for which patent application has been made.

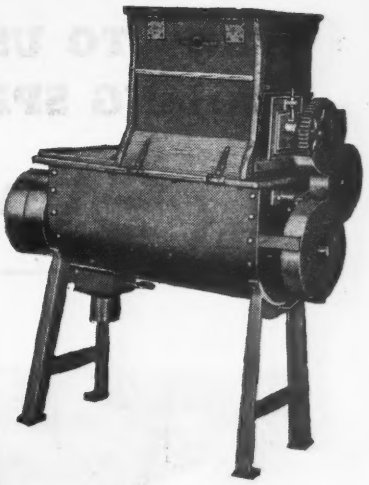
For the tests, the beeves were divided into wholesale trade cuts and each cut was scale-weighed with accuracy to an ounce. Companion cuts for each beef were subjected to the two aging procedures so that the test results would be comparable.

In addition to the savings in shrink and trim losses and increased turnover in beef-aging capacity of existing facilities, the quick-age procedure makes aging installations possible at point of retal sales, whether through a packaged frozen-food outlet or through a fresh meat retail outlet. As used

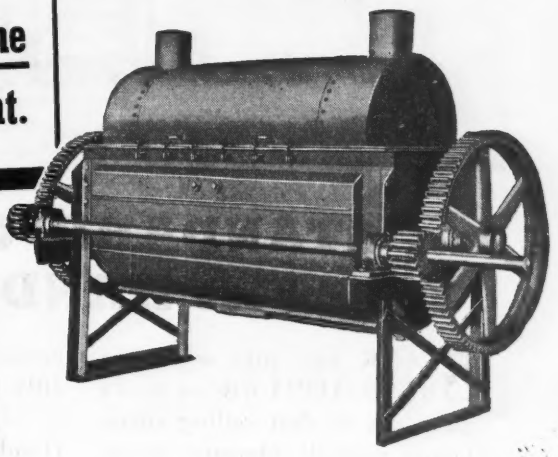








**Whatever your mixing problem, you are certain to find in the SPROUT-WALDRON line the one MIXER that will do exactly what you want.**



Whether you want to mix and blend, or mix and debulk, or mix and fluff or aerate, or mix in transit, there is a SPROUT-WALDRON MIXER for that specific task.

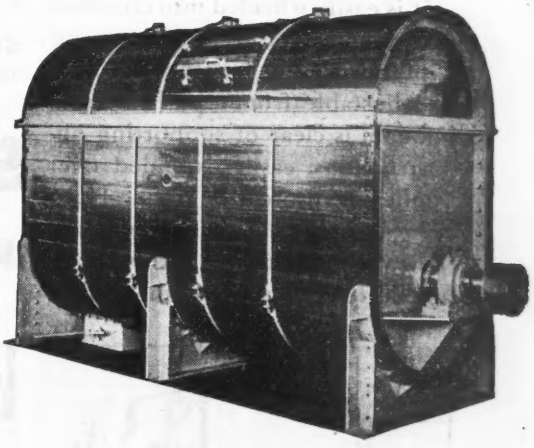
You will find practically every basic type in the line—batch and continuous, vertical and horizontal, open and closed, hand and self-loading, lined or unlined, with or without jackets and in a wide range of sizes.

Materials of different specific gravities, of different particle sizes, of different moisture content or of other specific characteristics can be mixed successfully and economically in SPROUT-WALDRON MIXERS.

Nowhere else will you find such diversity of mixing equipment, nor a longer or more extensive experience in the plant of any one manufacturer.

Out of this experience—kept fresh and resourceful by thousands of tests in the Experimental and Proving Department—you enjoy the benefit of suggestions for arrangements or combinations of equipment that save processing time, increase output, save time, floor space, machinery investment or which improve control of quality and uniformity.

You can start using SPROUT-WALDRON'S 78-year reservoir of experience by writing us about your process and asking for suitable Bulletins on Mixers.



# SPROUT, WALDRON & COMPANY

*Manufacturing Engineers Since 1866*

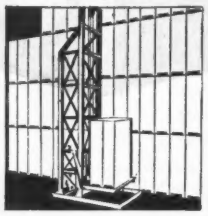
111 WALDRON STREET MUNCY, PENNSYLVANIA

**WANT TO USE THAT CEILING SPACE for Storage?**

**Ask STANDARD CONVEYOR about the HANDIPILER!**

STACK and pile with the HANDIPILER — make good use of that ceiling space. Loads, unloads, elevates, stacks, handles cartons, cases, bags, other packages. Compact, lightweight, safe, easy to operate, flexible, it is easily wheeled into crowded corners, around the shipping platform—fine for truck loading. Adjustable (from top of machine) boom is clear of supporting obstructions; easily extended over piles or into car or truck. Floor locks hold machine in position. Reversible carrying apron. Available in four sizes, high and adjustable up to 7½, 8½, 9½, and 10½ feet; stacks commodities as high as 12, 13, or 14 feet. Handles individual items up to 100 lbs. Motor mechanism in base frame—plug into any convenient outlet. Write for Bulletin No. FI-105

**STANDARD CONVEYOR CO.**
*General Offices:* North St. Paul 9, Minn.
Sales and Service in Principal Cities


TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

**PAUL WILLIAMS DIES**

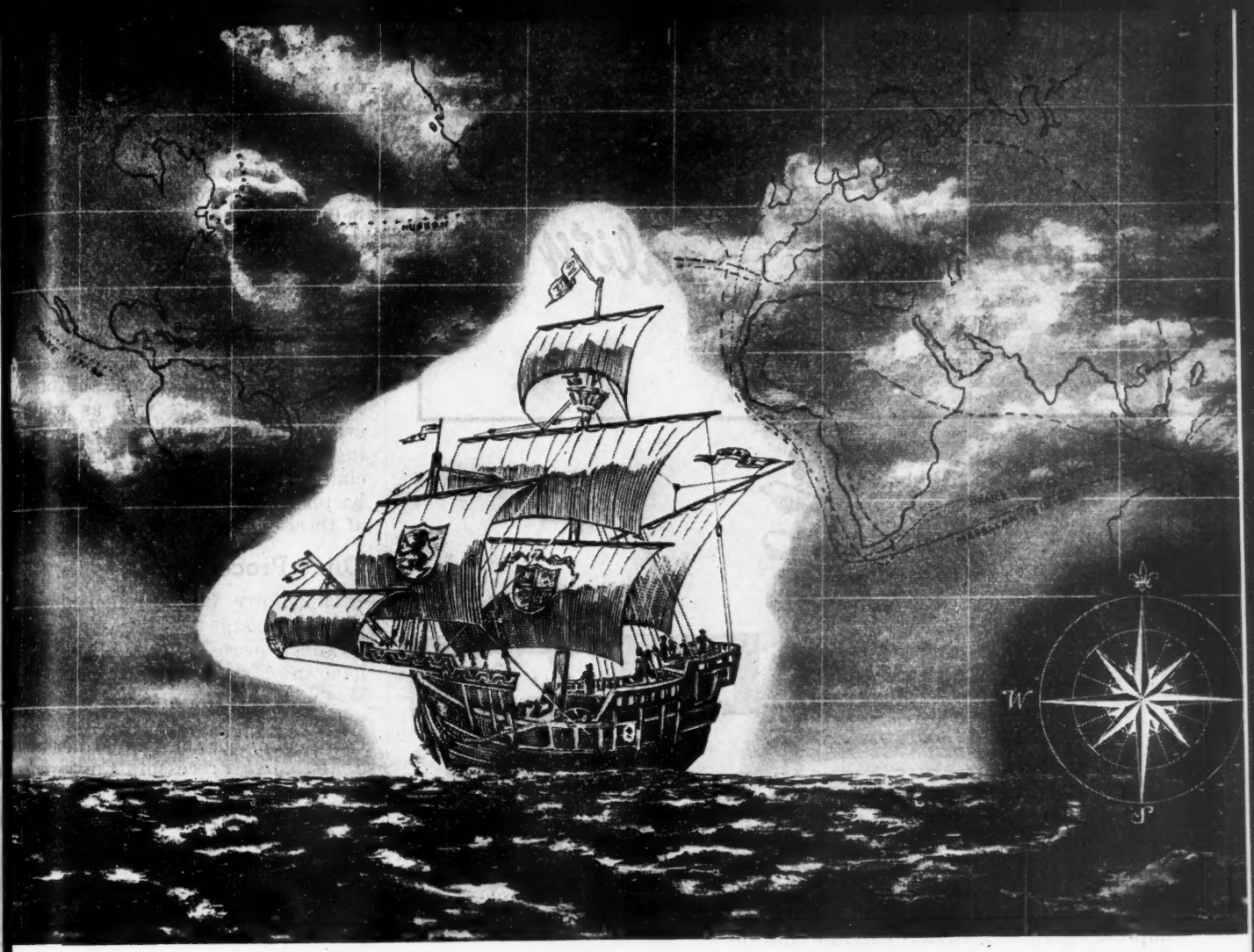
**Paul M. Williams, of the Department of Agriculture, died on October 5 following a throat operation. Mr. Williams is well known in the industry for his work in establishing and developing U. S. standards of quality for canned, frozen and dried foods, and in promoting their use among commercial packers. In 1931 he was placed in charge of the official grading and inspection service for processed fruits and vegetables. From this activity grew the present continuous inspection service of the department as well as U. S. grade labeling**

at present by Freezer Foods, Inc., the 6x6x3-ft. quick-aging rack or unit has been under experimental operation in its Hubbard Woods, Ill., frozen-foods store for more than a year.

The installation provides for the employment of meat cutters engaged wholly in meat-cutting operations in a glass enclosed and cooled area into which the aged beef may be taken directly from the aging racks. As the aged wholesale cuts are divided into retail cuts they are packaged and put into freezers.

## Dairy Course Offered At Brooklyn Polytech

NEW graduate course on the Technology of Dairy Products has been announced by the Department of Chemical Engineering of the Polytechnic Institute of Brooklyn for the academic year 1945-46. This course, designed to cover the technological, sanitary, and manufacturing aspects of the production of milk and milk products, is to be given under the direction of Dr. Morris B. Jacobs, Senior Chemist of the Chemical Laboratories of the Department of Health of the City of New York. Dr. Jacobs is well-



# Man has made History in quest of Spices

Magellan . . . Columbus . . . Drake . . . Hendrik Hudson . . . their initiative and daring are etched in the annals of time . . . pioneers of a shorter route to the inscrutable East where fabulous treasures of coveted spices and spice oils beckoned. They made history in this quest.

Florasynth reproductions of rare spice oils are truly a pioneering accomplishment. They offer valid proof of the ability of our laboratories to reproduce, with remarkable faithfulness, the most delicate spice oils for every type of food production . . . Florasynth research has made history in practical synthetics . . .

***Among these Florasynthetic Spice Oils are—***

| | |
|---|---|
| ANISE | CLOVE |
| CARAWAY | CORIANDER |
| CARDAMON | MACE |
| CASSIA | MUSTARD |
| CINNAMON | NUTMEG |

CINNAMEIN CRYSTALS
(Cinnamon Almond Aroma)

*Florasynth* LABORATORIES, INC.

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SEATTLE 4

Florasynth Lab. (Canada) Ltd.—Montreal • Toronto • Vancouver • Winnipeg. Florasynth Laboratories de Mexico S. A.—Mexico City

*don't let bacteria rob your quality!*

**play safe with LO-BAX***

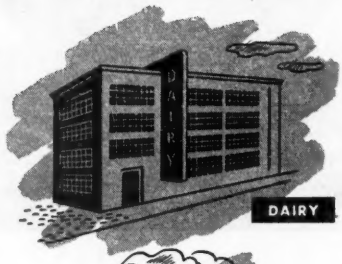
Bacteria lurk and breed in food and beverage plant equipment that isn't kept scrupulously clean and sanitized . . . and when bacteria count goes UP—quality comes down.

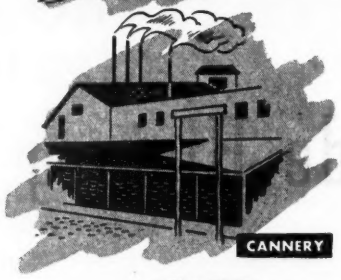
Lo-Bax, the concentrated, fast-killing chlorine bactericide helps prevent food spoilage, improves quality standards by rigidly controlling bacteria, keeping down mold and sanitizing all surfaces with which food or beverages come in contact.

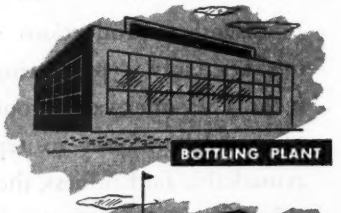
Simple and easy to handle—Lo-Bax kills bacteria almost instantly on contact . . . and at amazingly low cost. Dissolves quickly in water—hot or cold, hard or soft—to make clear chlorine-rinse solutions. Lo-Bax, with its 50% available chlorine, is dependable—retains its strength as packed in original container.

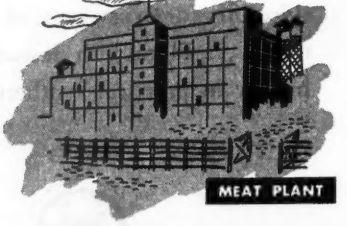
Play safe the Lo-Bax way the year round! Write for further helpful information on the use of this high-speed, versatile bactericide.

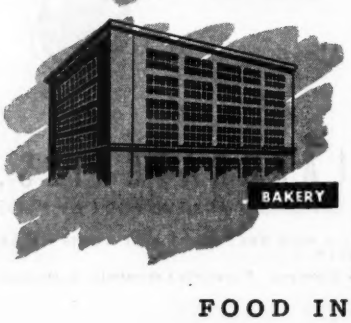
**THE MATHIESON ALKALI WORKS (INC.)**
60 East 42nd Street, New York 17, N. Y.




***LO-BAX**
**50% AVAILABLE CHLORINE**

**LO-BAX SPECIAL** — a superior chlorine bactericide in granular form — packed in 2½-lb. bottles, ½ doz. to the case; and in 14-oz. bottles, 1 doz. to the case.

**LO-BAX POWDER** — a highly efficient chlorine bactericide packed in 28-oz. bottles, 1 doz. to the case.

**Mathieson**
**LO-BAX**
**CHLORINE BACTERICIDE**

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known as a contributor in the field, and as the author of the widely used treatise on the chemistry and technology of food and food products. In this course Dr. Jacobs will deal with the physical and chemical properties and composition of milk, and with its pasteurization, fortification, homogenization, bottling, and marketing. Attention will be given to the manufacture of cream, butter, cheese, ice cream, and other frozen desserts, as well as to the evaporation, condensation, and drying of milk and milk products. Special emphasis will be given to the bacteriological and chemical control of these manufacturing steps.

## Olive Processing

IF alkalinity is controlled during the first stage of the ripe olive pickling process, the olives will have a darker, richer color, Dr. W. V. Cruess, professor of food technology at the University of California, told the annual meeting of the Olive Processors Conference recently. Use of calcium ions tends to fix this color, he stated. Though Sevillano olives are difficult to darken when prepared by themselves, a dark color will develop satisfactorily if they are mixed with the Mission or Manzanillo varieties, the group was told.

# RAW MATERIALS

## Limitation Set on Purchases of Hops

BREWERS purchases of hops and hop products will be limited to a quantity not exceeding 150 percent of that used in the production of malt beverages during the year ending June 30, minus September 1, inventories. This action was taken in amendment No. 11 to War Food Order 66, effective September 12.

Approximately 43,000,000 lb. of hops will be available to the American brewing industry in 1945. This is sufficient for domestic requirements, and the purpose of the amendment is to assure equitable distribution among brewers. Without limitation restrictions under WFO 66, some operators might be unable to acquire needed supplies while others would build up large inventories.

## Increase Acreage

A 23 percent increase in wine grape acreage is anticipated in California during the next five years as a result of vinters' postwar plans

# THE PACKAGE THAT APPEALS TO ALL THREE

All concerned—the shopper, the retailer, the manufacturer of the product—have good reason to endorse the advantages of Du Pont Cellophane packaging.

**The shopper can choose with her eyes.** That's the way she likes to buy. (In a survey made under normal peacetime conditions, 90.8% of the housewives questioned said they preferred transparent packaging.) The thrifty shopper will *look* for value—and she'll see it in Cellophane.

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**The manufacturer secures packaging economy.** Du Pont Cellophane helps cut distribution costs . . . permits more value to be passed on to the shopper. It gives genuine packaging economy—transparent protection at lowest cost.

Now that the war is over, we hope there will soon be sufficient Du Pont Cellophane to enable our converters and ourselves to meet your requirements. Write for the booklet, "Help Yourself," to guide you in your package planning.

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to plant an additional 40,000 acres, it was reported recently by the Wine Institute, San Francisco. At present 174,194 acres are planted in the state. Production facilities are expected to be increased a corresponding amount from the present level.

## Need More Labor for Fall Crop Harvest

THREE MILLION MEN, women and children will be needed during the months of October and November to harvest the nation's 1945 bumper crops, the Department of Agriculture reported.

Although about 2,500,000 farm labor placements were made during the first seven months of this year, the Department's Extension Service stated that the shortage of farm labor is now at its tightest point of the war years.

There has been some scattered increase in the farm labor supply as the result of the cessation of hostilities, troop demobilization and war industries cut-backs. However, these gains have been offset by the departure of workers from farms since the lifting of manpower controls.

On the basis of 1944 placement records, and the present crop conditions, it is estimated that about 3,000,000 placements will have to be made during the next two months to complete this year's harvesting of essential food and feed crops.

## Sugar Quotas Stay

SUGAR allotments during the fourth quarter will be maintained at the same rate as during the third quarter, the OPA has announced. This means 60 percent of their 1941 use for bakers, manufacturers of cereal and cereal paste products and 50 percent of 1941 use for most other foods, including ice cream. One exception are fruit spreads, which are allotted 50 percent of the manufacturer's 1944 use.

## Farm Truck Control

CONTROL of the use of truck hauling milk and dairy products will be terminated November 1, according to an ODT announcement made last month. By revoking ODT 19 and ODT 26, the agency ended its truck conservation program instituted in agricultural areas during the war.

Control of truck shipment of livestock will be revoked at the same time.

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# INDICATORS

## Production

**Canned fruit** packs reported for 1944 and 1943 by National Canners Association are given below (actual cases in thousands; 000 omitted):

| | 1943 | 1944 |
|---|---|---|
| Apples | 1,878 | 3,356 |
| Apple sauce | 2,226 | 4,302 |
| Apricots | 1,256 | 8,030 |
| Blackberries | 310 | 397 |
| Blueberries[1] | 438 | 114 |
| Gooseberries | 28 | 31 |
| Loganberries | 50 | 19 |
| Raspberries | 209 | 102 |
| Strawberries | 8 | ... |
| Red pitted cherries | 562 | 3,072 |
| Sweet cherries | 912 | 932 |
| Cranberry sauce | 1,672 | 1,546 |
| Figs[2] | 981 | 943 |
| Fruit cocktail[2] | 5,653 | 6,302 |
| Grapefruit segments | 985 | ... |
| Olives | 1,081 | 950 |
| Peaches | 11,450 | 14,035 |
| Pears | 4,648 | 4,801 |
| Pineapple | 10,981 | 10,159 |
| Plums | 591 | 301 |
| Prunes in sirup | 1,922 | 1,151 |
| Spiced peaches | 21 | 41 |
| Fruit Juices | | |
| Apple juice | 1,740 | 2,851 |
| Grapefruit juice | 22,637 | ... |
| Orange juice[3] | 7,372 | ... |
| Blended citrus juice | 5,563 | ... |
| Pineapple juice | 8,230 | 7,954 |

[1]Includes huckleberries. [2]California only. [3]California and Florida only.

**Evaporated milk** production in July was 20 percent above a year ago and 51 percent higher than the prewar average. The output of condensed milk was 14 percent higher than a year ago and 84 percent above the 1939-43 average.

**Creamery butter** production was 11 percent less in 1944 than in 1943, amounting to 1,488,552,000 lb. That was the third consecutive year in which butter output was less than the year before. The peak production, in 1941, was 1,872,183,000 lb.

**Cheddar cheese** output in 1944 totaled 805,485,000 lb., a gain of 5 percent over 1943 and of 19 percent over the 1938-42 average. Except for the 916,850,000 lb. produced in 1942, this was the largest output on record.

**Canned evaporated milk** output totaled 3,435,222,000 lb. last year, the greatest for any year except the 3,518,504,000 lb. output in 1942. It was 27 percent above the 1938-42 average.

**Dry whole milk** production hit an all-time peak in 1944. Totaling 177,877,000 lb., it was 29 percent larger than in 1943 and 386 percent larger than the 1938-42 average.

**Nonfat dry milk solids** produced in 1944 totaled 582,516,000 lb., a new record. It was 14 percent higher than in 1943 and 61 percent above the 1938-42 average.

**Margarine** output hit a high of 612,900,000 lb. in the 1944-45 fiscal year, 3,000,000 lb. above the 1943-44 figure. Civilian consumption increased to 554,600,000 lb. to more than offset a drop from 126,000,000 lb. to 58,300,000 lb. in Lend-Lease, other government agency and export demands.

**Flour** production in August was 1,491,362 sacks higher than a year earlier, according to *The Northwestern Miller*. The August output of 15,982,254 sacks, representing 73 percent of the total for the United States, was higher than in July by 759,348 sacks.

**Frozen egg** production amounted to 31,500,000 lb. in July, 40 percent less than a year earlier. The total for the first seven months of the year was 345,620,000 lb., against 451,440,000 lb. for the same period of 1944.

**Dried egg** output in July was 7,937,000 lb., 75 percent less than in July, 1944. Of the July production, 6,952,000 lb. was whole egg; 221,000 lb., albumen; and 764,000 lb., yolk.

## In Storage

**Cold storage** space is expected to be adequate for the rest of the season. Freezer occupancy was at 81 percent on September 1 and is not expected to go above 84 percent. Occupancy of both coolers and freezers in public warehouses increased during August.

**Frozen fruits** in cold storage on August 1 totaled 238,746,000 lb., compared with 169,518,000 lb. on July 1 and 214,460,000 lb. on Aug. 1, 1944.

**Frozen vegetable** stocks on August 1 were 131,819,000 lb., against 91,029,000 lb. on July 1 and 138,772,000 lb. on Aug. 1, 1944.

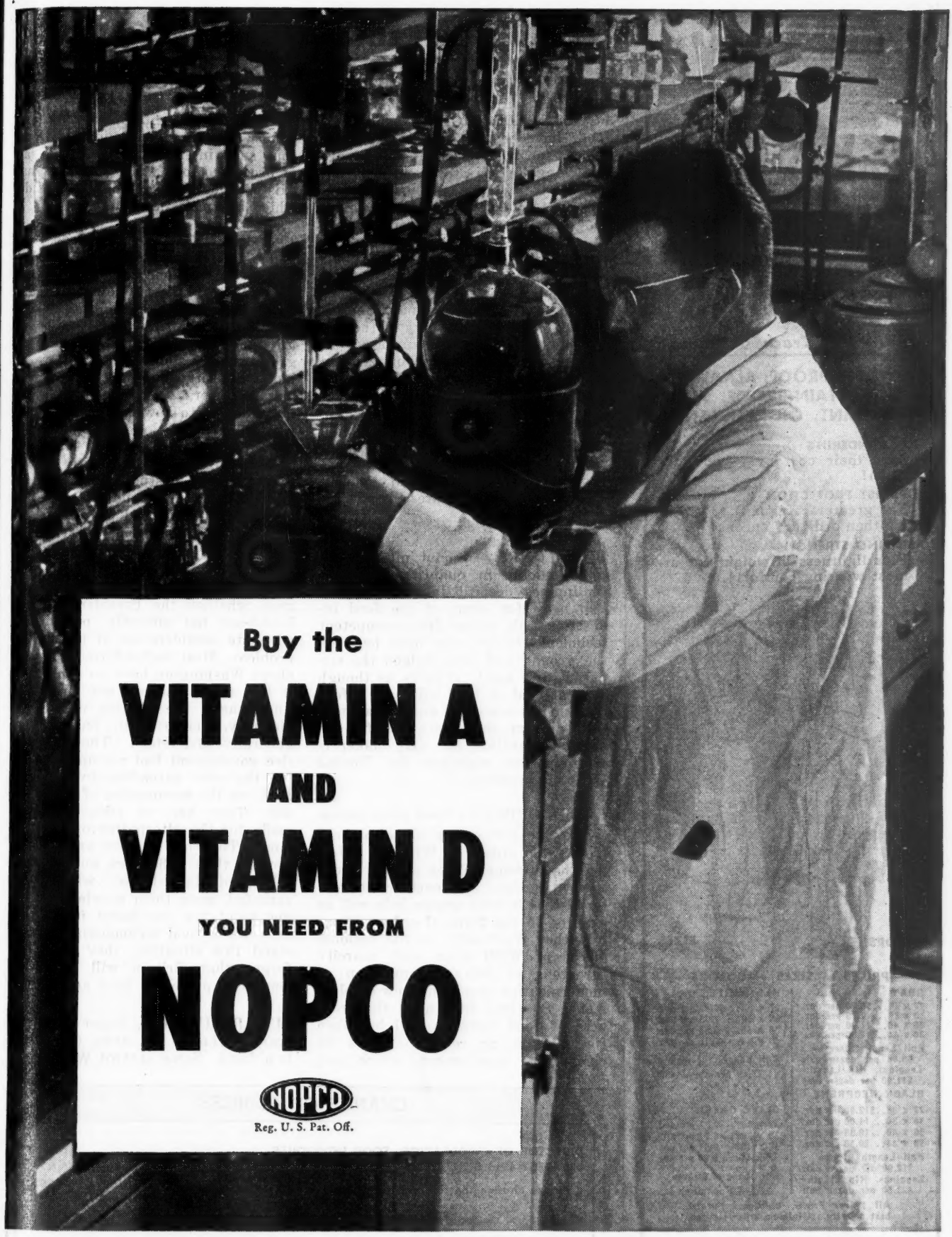
## Index

**Business activity** index of *Business Week* stood at 164.0 for the week ended September 22, compared with 183.6 a month earlier and 230.9 a year ago.

**Cost of living** index of National Industrial Conference Board stood at 106.9 in July, the same as in June but higher than the 105.0 figure for July, 1944.

# CONSTRUCTION NEWS

| | Pending (thousands) | Awarded September (thousands) | Total Awarded 1945 (thousands) |
|---|---|---|---|
| Bakery | $ 250 | $ 100 | $ 498 |
| Beverages | 930 | 45 | 1,002 |
| Canning and prev. serving | 500 | 47 | 1,147 |
| Cold Storage | 280 | 255 | 2,543 |
| Confectionery | 40 | ... | 150 |
| Grain Mill Products | 320 | 358 | 4,880 |
| Ice, Manufactured | ... | ... | 504 |
| Meats and Meat Products | 220 | ... | 787 |
| Milk Products | 835 | 765 | 4,379 |
| Miscellaneous | 2,753 | 705 | 10,423 |
| Complete 1945 totals | $6,128 | $2,275 | $26,308 |

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30 x 36... 9.78 per doz.
36 x 40...11.90 per doz.
36 x 44...12.60 per doz.
Full Length Sleeves $9.66 per dozen pair
Leggings, Hip Length $11.90 per dozen pair

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36 x 36.. 7.65 per doz.
36 x 40.. 9.35 per doz.
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# What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

**FOOD NEEDS HIGH**—Producers of foods have been "assured that there is need for every bit of food they are producing." This statement was addressed to the farmers by the Secretary of Agriculture late in August. It continues true both for farmers and for the food-processing industry. It is not expected that the crop goals can be cut back for 1945 except in a very few cases. The world will need, and will get, anything which America can spare. The only worry of the Department of Agriculture appears to be on supporting of prices for farmers where locally or briefly there are surpluses such as hit the potato market early this fall. The Administration expects that Congress will grant subsidy arrangements to put floors under prices for that kind of cases so that crops production and factory output can continue at peak rates for at least another year.

**HOW LONG?**—Coconut oil will not come quickly in quantity from the Philippines despite Japanese defeat. Bad news for many of the food industries, this comes from competent technical persons who have been on the ground and have judged the situation first hand. It looks as though a great deal of 1946 will pass before regular imports of oil and oil raw materials from the South Pacific can begin. Meantime, the soap maker is a competitor claimant for limited U. S. oil supplies.

**RATED ORDERS**—Food plant executives can expect both nuisance and aid from rated orders of WPB for a few months to come. When a plant needs a new machine or construction material that is very scarce, help will be granted in the form of order ratings by either Washington or the regional offices of WPB when such scarcity threatens to delay reconversion or modernization promising new employment. But in a few cases, the products of food factories will be taken for military or relief purposes by comparable requirements which may interfere briefly with marketing programs. Washington confidently hopes that such interference with the sale of processed food will be far less than existed under the system of set-asides which has prevailed.

**TAX RELIEF**—When the food technologist tries to persuade his employer that more money should be spent in the factory, he may now legitimately argue that excess-profits taxes will not apply after this year. This seems an almost certain prospect as Congress strives sincerely to set up an industrial situation that will permit manufacturers to create more jobs. Decisions as to new equipment in the factory are no longer legitimately held up solely on the theory that taxes are too high. Nor is it any longer reasonable to postpone them simply because "equipment and materials are still too scarce." Food processors can get even scarce materials with the aid of WPB—if they really need them.

**EX LEND-LEASE**—Washington argues whether the President cut off lend-lease too abruptly, or without adequate consideration of the British problem. Most well-informed persons about Washington have no doubt that it had to be cut off, and promptly. The reason the British reacted so violently, even critically, has not been generally understood. The new Attlee government had set up a budget for the year extending to June 30, 1946, on the assumption of continued war. They had no adequate plans made for the alternative of Jap collapse. They had to have an explanation for their difficulties, and the canceling of Lend-Lease, which they expected, gave them a splendid talking point for the home folks. But even when food technologists understand this situation, they must not forget that Britain will take less American processed food as a result.

**SUGAR SUBSIDY**—Sugar continues scarce. That is not news (though it is a fact). Some shrewd Washington


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legislators and representatives of sugar industries are attempting to take advantage of the fact to develop a new argument in favor of a government subsidy for domestic sugar producers. There is no evidence yet as to whether that effort will succeed. If it does, it may bring more sugar to the food industries and the family sugar bowl from sources not too sound in economics. It is a trend to be watched by sugar-using industries.

**SURPLUS FOOD PLANTS**—As the Army and Navy shrink their numbers, there will become available substantial surpluses of everything. This will include a considerable amount of equipment and a few food processing plants which may have large value for the food industries. Some Army camps and forts have huge food-handling facilities, which include storage and freezing equipment. Those who want to get machinery quickly should watch for the camp closings, as they may be able to grab some facilities of value, and perhaps at a favorable price. Machinery companies which have installed this equipment may be able to make friends by getting it back and reconditioning it for their commercial customers quicker than they can build entirely new equipment. It is a source of food plant equipment that cannot well be ignored by either buyers or sellers of food machinery.

**FISH FARMS**—Experiments in fish culture in Alabama stir some official interest in Washington. The story is that the smart farmer with a fish pond can grow 500 to 600 lbs. of fish per acre of water by proper stocking of a pool with fingerlings and proper use of fertilizer. The cost is reported as 3 to 6 cents per pound of catch. One wonders whether this may not be a new food industry in the making, with the fish farm to supply the raw material and the fish processor as the first step to market.

**THE BAD 3-F's**—Regardless of plans and policies in reconversion and post-war effort, there will be three serious and long continuing troubles for most of the manufacturing industry. Fuel, freight and food will continue scarce despite all that the best planners can do for us and the country.

**FLAME PRUNING**—The military flame thrower is a "sword" that is being beaten almost literally into a "plow share." Serious effort is being made to use this spectacular war implement for weeding and pruning. One of the early applications has been in the sugar-cane field. The new technic of burning out the unwanted weed or unwanted part of growing plants suggests a new means of reducing the field labor requirements. And anything which saves stoop labor, or any other labor for that matter, is welcome in these days of constantly rising wages.

Yes, a grocer *is* selling greater nutritional values . . . better health . . . when he offers products fortified with Monsanto Mineral Supplements. And modern homemakers have learned to look for foods that are enriched for better nutrition.

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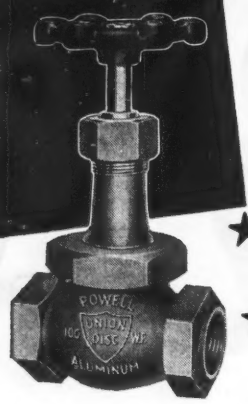


**Fig. 1853** — Aluminum Globe Valve with screwed ends, union bonnet, and renewable vulcanized composition disc. Can be supplied with 18-8S stem.

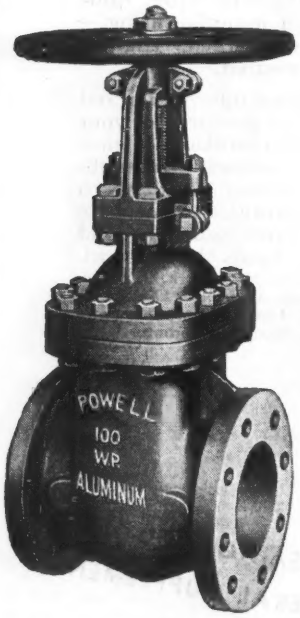


**Fig. 2461**—Large size Aluminum Gate Valve with flanged ends, bolted flanged bonnet, outside screw rising stem and taper wedge double disc. Can be supplied with 18-8S disc and stem.

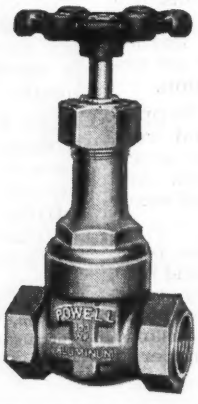


**Fig. 1859**— Aluminum Gate Valve. Screwed ends, screwed-in bonnet, inside screw rising stem and taper wedge double disc. For more severe service, we recommend 18-8S disc and stem.

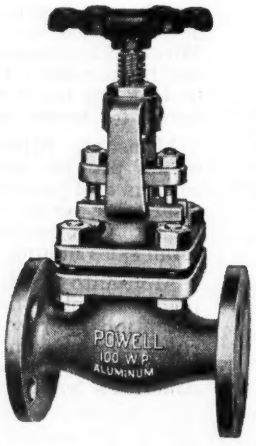


**Fig. 1946** — Aluminum Gate Valve with flanged ends, bolted flanged bonnet, and outside screw rising stem. Taper wedge double disc in sizes 1" and larger. Also available with 18-8S disc and stem.

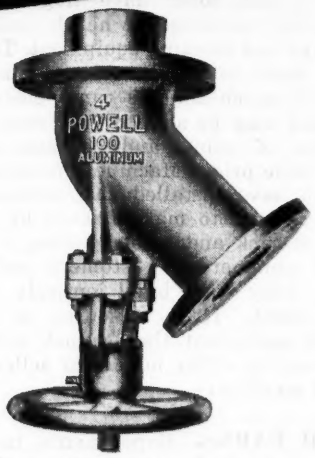


**Fig. 2309A**—Aluminum Flush Bottom Tank Valve for attaching to metal tanks and autoclaves. Also available with 18-8S disc, stem and seat plate. In this design the disc rises into the tank to open the valve.

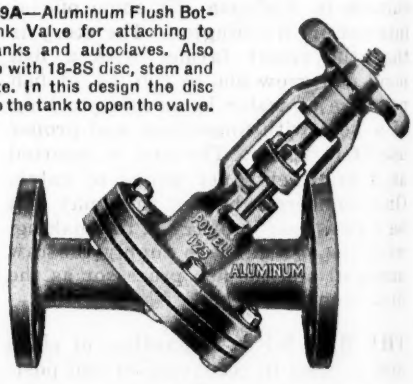


**Fig. 1097A**—Aluminum Separable Body Reversible Seat "Y" Valve. Also available with 18-8S disc, stem, lock nut, gland and seat plate. Lower half of the body can be unbolted and turned through an arc of 180 degrees to make a 90-degree angle valve, for special piping arrangement and to eliminate extra fittings.

*ALUMINUM VALVES are particularly well adapted for handling glacial acetic acid, acetic anhydride, ammonium hydroxide, concentrated nitric acid, hydrocarbons and distilled water. They also have a special application in food processing and dispensing, in the manufacture of naval stores, and in plants where non-sparking materials are required.

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# POWELL VALVES

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## INDUSTRY

**The Borden Co.'s Farm Products Division** at Croghan, N. Y., has been closed after 30 years of operation. The plant was erected by the Howell Milk Co. and later sold to The Borden Co.

**Canadian Canners (Western) Ltd.** has reopened its plant at Oliver, B. C., and is canning apricots, peaches and prunes. The plant opened in mid-July, having been idle since 1942.

**Citrus Concentrates, Inc.,** Dunedin, Fla., was damaged by fire recently to the extent of $2,000,000. Bruce Skinner, vice-president of the company, states that rebuilding will begin at once. Other fires reported during the month were: F. B. Huxley Co., Ontario, N. Y., dehydrating plant, where damage was estimated at $200,000; the plant of the Mount Airy Canning Co., near Copeland, N. C., with resultant loss of $75,000; the warehouse of Washington Packers, Inc., Sumner, Wash., where loss was figured at $75,000 to $100,000 and the soybean processing plant of Knowles & Son at Crawfordsville, Ind., also estimated at $75,000.

**The Dairymen's League** is planning to erect a new $150,000 butter plant in Utica, N. Y., as soon as materials are available.

**Fanny Farmer Candy Shops, Inc.,** expects to build a new manufacturing plant in New York soon. Cost of construction is estimated at $800,000 to $1,000,000.

**Fewel Bros. & Co.** has completed negotiations with the government to operate the Selma Dehydrating Corp. plant in Selma, Calif. The plant, formerly operated by the Kingsbury Cotton Oil Co., has 16 tunnels with a daily capacity of 200 tons of fresh grapes.

**Imperial Ice Cream Co.** stockholders voted recently to sell the firm's 21 manufacturing plants and distribution branches to Fairmont Creamery Co., Omaha, Neb., for approximately $1,500,000.

**Loose-Wiles Biscuit Co.** will erect a new $3,000,000 Sunshine bakery, the most modernly equipped institution of its kind in the industry, in Kansas City, Kan.

**The Loudon-Bowman Division** of Standard Brands, Inc., is building a new unit at its Terre Haute, Ind., plant to house the division's central laboratories. The laboratories are engaged in the research of processing and packaging of frozen fruits and vegetables.

CHARLES C. EIKEL

**After fifty years of service with Armour and Co., Charles C. Eikel has retired. Over the years, he has contributed greatly to the development of Armour's cutting and curing operations, and, in 1926, he organized and became the head of the division for quality control.**

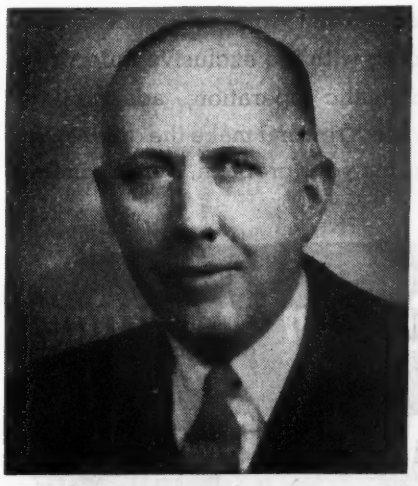
DEWEY H. ROBBINS

**Appointment of Lt. Com. Dewey H. Robbins as head miller of Fisher Flouring Mills Co., Seattle, was announced recently by J. L. Locke, manager. He has been general milling technologist for the mill since 1933, except for the last three years when he has been on leave of absence for the Navy.**

**National Research Corp.,** Boston, has started construction of an orange dehydrating plant at Plymouth, Fla.

**Purity Bakeries Corp.,** Chicago, owner and operator of Grennan Cakes, Inc., Buffalo, has sold the Grennan plant in that city to Wildroot Co., Inc.

**Texsun Citrus Exchange** is the recently announced new name of the Rio Grande Valley Citrus Exchange of Weslaco, Tex.



GRAHAM ADAMS

**Executive secretary of National Dehydrators Association since 1942, Graham Adams recently was elected president. Headquarters of the association are in Chicago.**

**Virginia Beach Frozen Foods, Inc.,** Princess Anne County, Va., has been granted authority by the State Corporation Commission to engage in the frozen foods business. Officers are: W. H. Kitchen, Jr., president; Virginia Morrison, vice-president, and F. E. Kellam, secretary.

## PERSONNEL

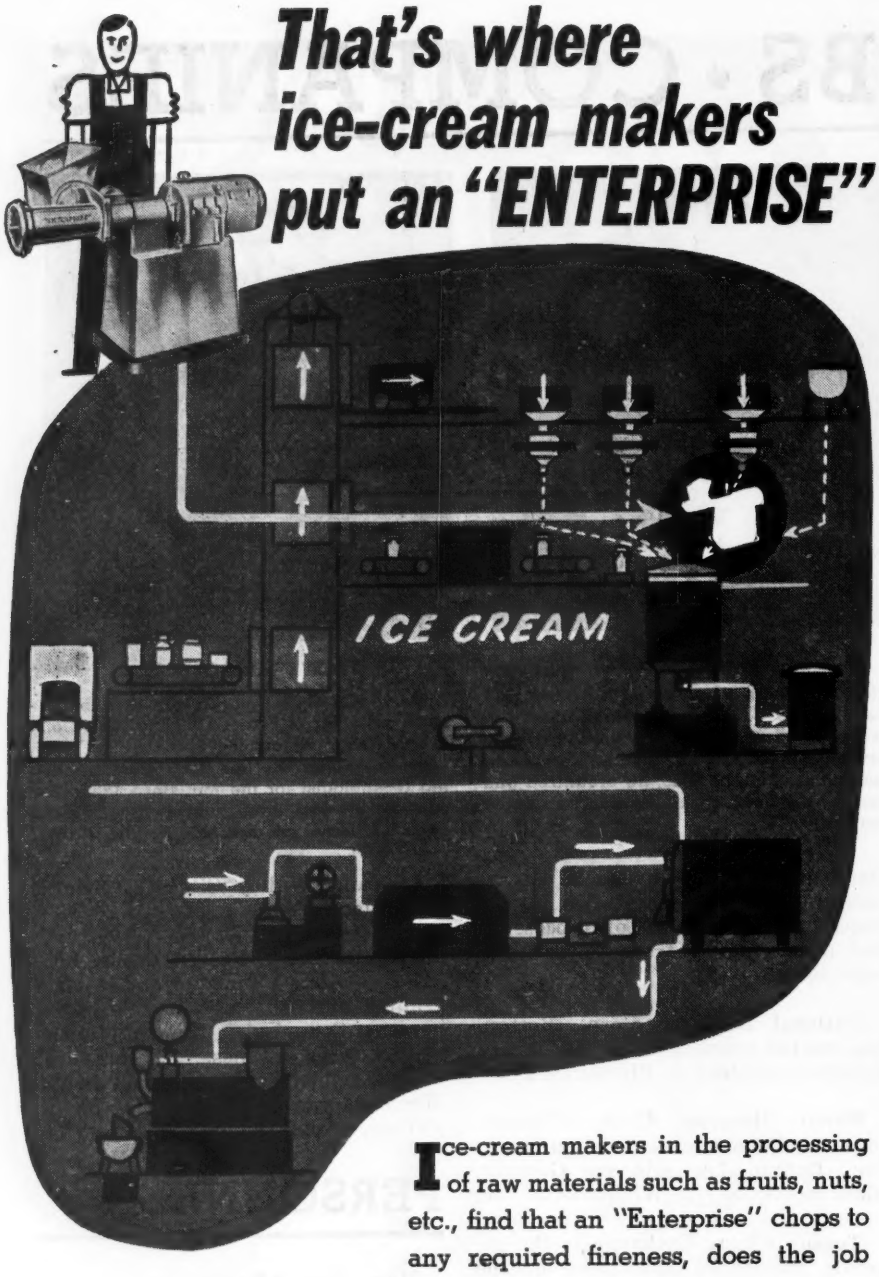
**Mary Jane Albright** heads a program for the promotion of spaghetti, macaroni, vermicelli and noodles by the Wheat Flour Institute, educational division of Millers National Federation. The project is financed by the durum millers and constitutes an expansion of Wheat Flour Institute's plan to promote the use of bread, rolls, cakes and the many other foods made from wheat.

**M. W. Anderson** recently has been appointed quality control manager of the several canning and frozen food companies that make up the North Pacific Canners and Packers Association, Portland, Ore.

**J. Lloyd Barron** has become sanitary engineer of the National Biscuit Co. He has been active in milk and food control in the New York area for the past 15 years.

**Nelson H. Budd** has resigned as editor of Good Packaging magazine

# That's where ice-cream makers put an "ENTERPRISE"




Ice-cream makers in the processing of raw materials such as fruits, nuts, etc., find that an "Enterprise" chops to any required fineness, does the job with speed and economy.

Packers, bakers, canners, confectioners—all sorts of processors—are getting a better product at a lower cost, with the exclusive Enterprise System of Cutting. Razor-cutting, automatic operation, adaptability, dependability, advanced engineering—*they're* what make the difference.

What food do you reduce? If you'll outline your problem, our engineers will be glad to make suggestions.

**The ENTERPRISE System of Cutting**

It's exclusive! It's superior!

**The ENTERPRISE MFG. CO. of PA.**

PHILADELPHIA 33, PA.

**79 YEARS' EXPERIENCE BEHIND THE MODERN "ENTERPRISE"**

**DR. ARTHUR P. HELLWIG**

**Louis Ware, president of International Minerals & Chemical Corp., has announced the appointment of Dr. Arthur P. Hellwig as director of sales for the corporation's Amino Products Food & Pharmaceutical Division. Dr. Hellwig previously was sales manager of the Specialty Products Division of American Maize-Products Co., New York.**

to become director of the information division of National Canners Association, Washington, D. C.

**Tom M. Davis,** vice-president and general manager of Felber Biscuit Co., Columbus, Ohio, has been elected to the board of directors of the United Biscuit Co. of America, with headquarters in Chicago.

**W. R. Duerr,** vice-president and general manager of the Kansas Flour Mills Co., has been promoted to executive sales director of the parent firm, Flour Mills of America, Inc. In his new capacity, Mr. Duerr will be in charge of all export and government flour trade.

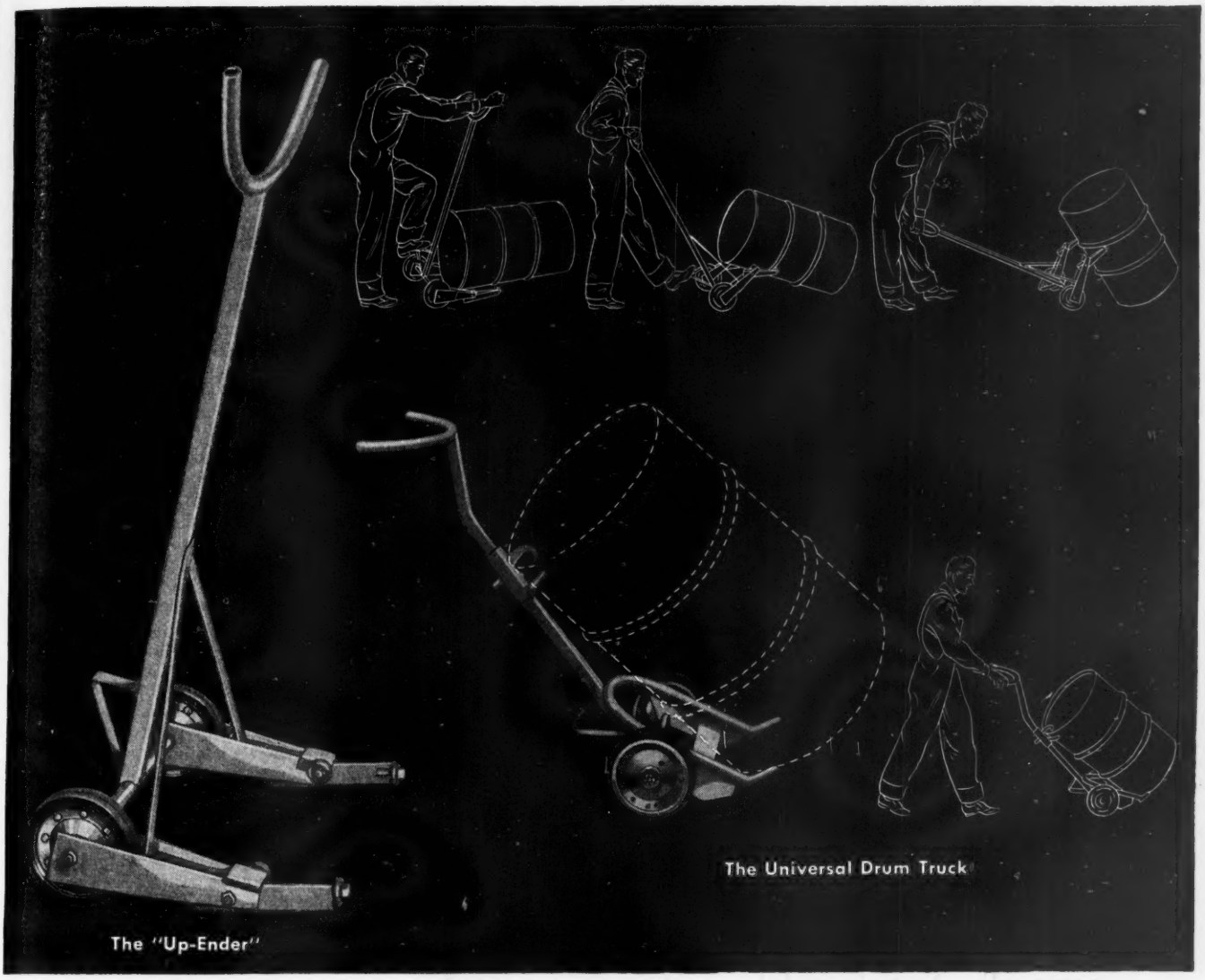
**Dr. W. S. Gillam,** professor of agricultural chemistry at Purdue University, has joined the staff of the Midwest Research Institute, Kansas City, where he will specialize in research in soils, plant nutrition and analytical services.

**Roy E. Ingalls** has resigned as manager of Washington Packers, Inc. He is succeeded by Harry D. Johnson, who has been associated with the organization for the past 17 years.

**D. C. McCarthy,** formerly vice-president in charge of operations, has been elected executive vice-president of Purity Bakeries Corp., Chicago.

**John P. Nielsen,** who has been in charge of the section for frozen vegetables at Western Regional Research Laboratory, is now research director for R. D. Kringle Frozen Food Co., Ogden, Utah.

**L. P. Reed,** vice-president and general manager of Merchants Biscuit




# The "Up-Ender"

The "Up-Ender"
Patent Applied for

● A new development by Colson—the "Up-Ender" for upending drums and barrels.

The "Up-Ender" makes the upending of drums and barrels a one-man job . . . saves time and manpower.

The "Up-Ender" and the Colson Universal Drum Truck make the perfect team for the handling of barrels and drums.

Write for complete information on the "Up-Ender" and other Colson materials-handling equipment.

★ BUY VICTORY BONDS ★

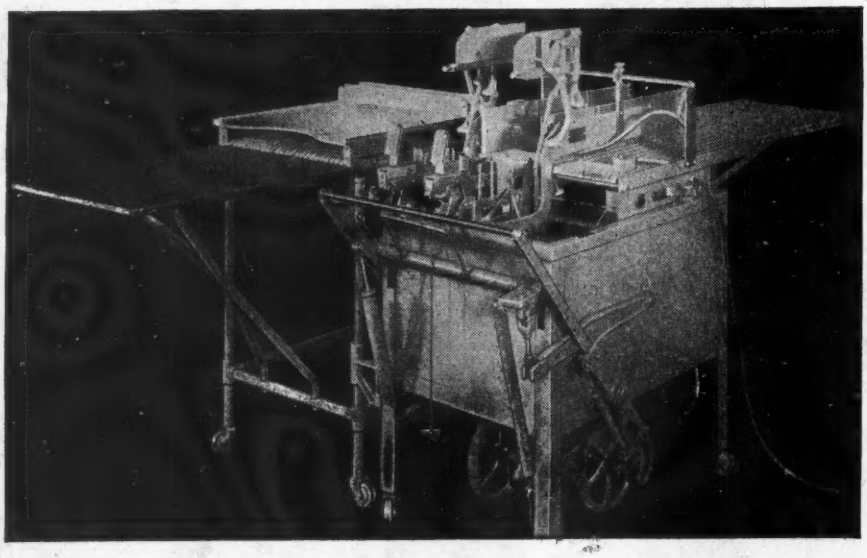
## THE COLSON CORPORATION

ELYRIA, OHIO

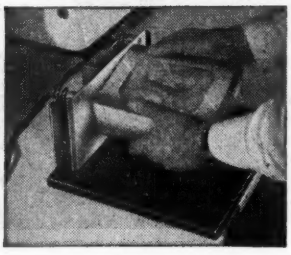
CASTERS • INDUSTRIAL TRUCKS AND PLATFORMS • LIFT JACK SYSTEMS • BICYCLES • CHILDREN'S VEHICLES
WHEEL CHAIRS • WHEEL STRETCHERS • INHALATORS • TRAY TRUCKS • DISH TRUCKS • INSTRUMENT TABLES

# Miller

## MODEL M P S WRAPPING MACHINE



SPEEDILY and economically wraps packages in many sizes. Cuts its own wrappers from cellophane or paper rolls. No tools needed to adjust. One girl is all you need to operate or adjust either the heat-sealing or glue-sealing models. Mounted on casters, the MILLER Model MPS can be rolled to the job. Plugs into any wall outlet for power. Send us samples of your packages. We'll quickly give you complete information on this versatile, dependable wrapping machine.



### CORLEY-MILLER MODEL BJ VERTICAL HOT PLATE

*Heat seals bags, cartons or other packages in MST cellophane, waxed, or thermoplastic coated papers. Ideal for trays or window boxes. Non-corrosive stainless steel and aluminum construction makes it perfect for use in quick freeze plants, locker plants and other damp locations.*

**MACHINES FOR:** WRAPPING, BAG MAKING, BAG AND CARTON FILLING, BAG CRIMPING OR CLOSING, GLUING AND SHEETING, SANDWICH MAKING.

Miller Wrapping & Sealing Machine Co.

12 SOUTH CLINTON STREET, CHICAGO 6, ILLINOIS


Co., Omaha, since 1941, has been elected president, succeeding the late C. A. Bowman.

**H. G. Schlaman** has been appointed sales manager of the baking and dairy industries products division of the Corn Products Refining Co. Prior to his appointment, Mr. Schlaman was a member of the company's technical sales department.

**Edward W. Schmitt** has been promoted to the position of bulk sales manager of Corn Products Sales Co. He previously served as division sales manager for the confectionery, bottling, canning and meat packing industries.

**Earl H. Selby** and **W. J. Roehl** have been appointed vice-presidents of G. Washington Coffee Refining Co. Both men hold similar offices with Harold H. Clapp, Inc., another American Home Foods subsidiary.

**George B. Wagner** recently was appointed sanitation engineer of Pillsbury Mills, Inc., with headquarters in Minneapolis.

**Hugo W. Wesin**, formerly assistant manager of Cudahy Packing Co., beef division, has been appointed manager, succeeding the late William Diesing, a former vice-president and director.

**John A. Valentine** has been appointed operations manager of Cramer Products Co., New York, manufacturer of cake and muffin mixes. Mr. Valentine was formerly with the Buffalo, N. Y., cereal plant of Best Foods, Inc. He will be in charge of all production at the Cramer plant.

## DEATHS

**Sylvan Braun**, 56, president of Enterprise Manufacturing Co., Philadelphia, recently.

**Fred W. Dold**, 73, president and founder of Fred Dold & Sons Packing Co., Wichita, Kan., recently.

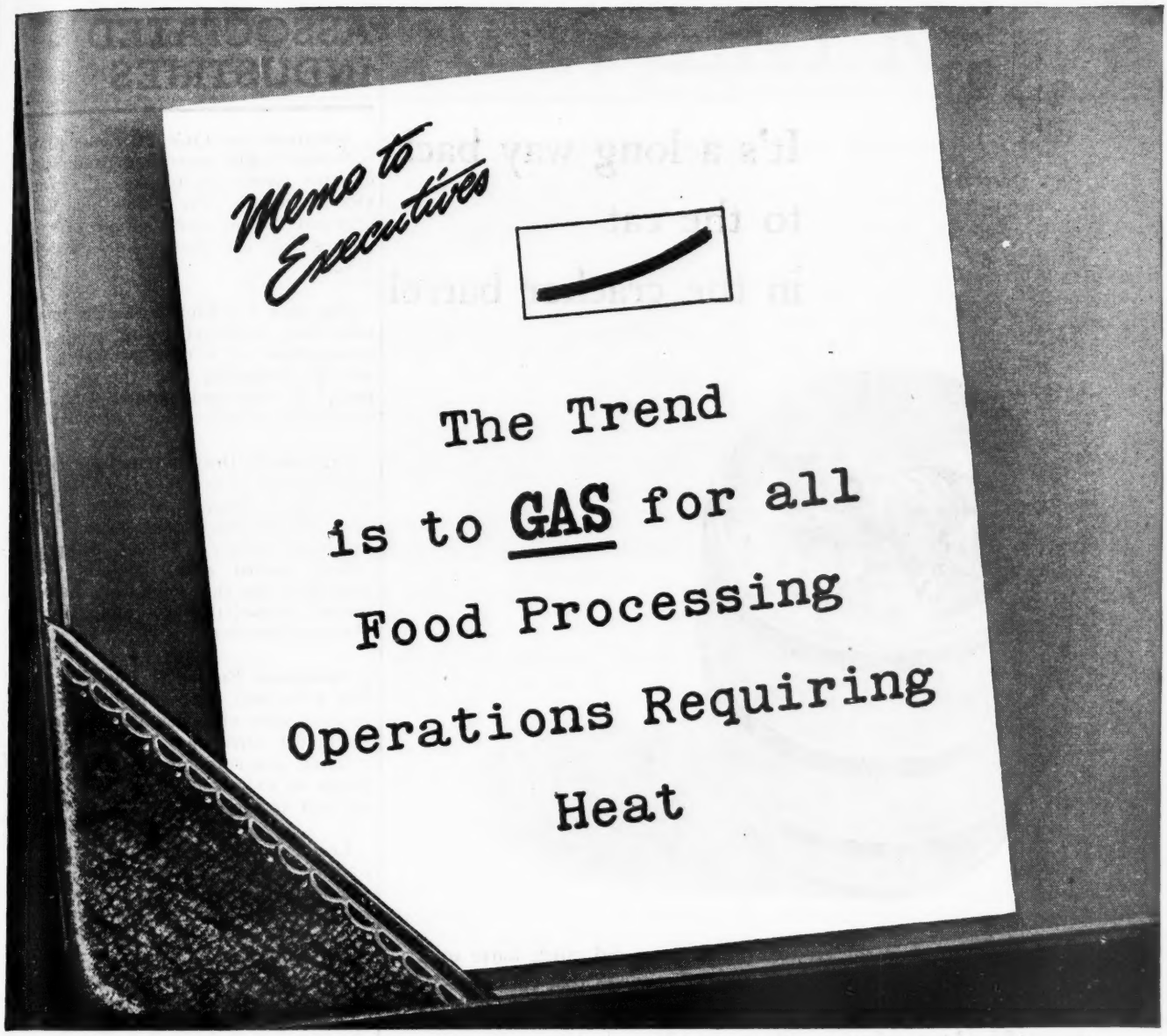
**D. Mayo Phillips**, 64, superintendent of Gum Products, Inc., Boston, September 9, in Cambridge, Mass.

**Carl J. Rose**, 53, head of Rose Food Co. and manager of Shedd Products Co. of Toledo, Ohio, August 30, in Columbus, Ohio.

**Frederick G. Schneider**, 78, founder of Home Bakery Co., Memphis, August 22.

**Arthur G. Spangler**, 66, head of Spangler Candy Co., Bryan, Ohio, August 31.

**Henry C. Veatch**, 85, eastern representative of the Kansas Milling Co., Wichita, recently, in Buffalo, N. Y.




Over the past ten years the use of Gas for all industrial operations, and particularly in the food processing field, has been most pronounced. So well have the values of this modern fuel been appreciated that the use of Gas by industrial and business establishments has doubled in that time to the amazing figure of over 1,350,000,000,000 cubic feet, used in 1944.

Constantly improved Gas industrial equipment, the result of unremitting research, is an important reason why the trend is to Gas in food processing. The combination of Gas and modern Gas equipment offers:

- Greater Economy, in unit and overall costs.
- Extremely close Automatic Control—a characteristic in which Gas is unsurpassed.
- Speed in production, because Gas is faster.
- Cleanliness which results in better products and improved working conditions.

These and other values which Gas and today's Gas equipment bring to your food processing operations make it imperative that you look into this fuel when planning post-war expansion or remodeling. It is made easier for you by the Industrial Gas Engineer of your local Gas Company, who is available for consultation.

THE TREND IS TO GAS

FOR ALL
HEAT PROCESSING OF FOODS

**AMERICAN GAS ASSOCIATION**
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

# It's a long way back to the cat in the cracker barrel

Maybe the cat in the cracker barrel never did much harm to customers of the crossroads store. But it's a cinch that cat-in-the-cracker-barrel methods are not tolerated in today's scientifically managed food processing, preserving or packing plant.

Matching the advances in food science with cleaning progress is the Wyandotte Representative, with his full line of cleaners to answer every need in the food industry — from washing a test tube to cleaning an out-sized vat.

Whether your business is food packing, processing, debulking, dehydrating or quick freezing — your cleaning job simple or highly complex — the Wyandotte Representative has the products and the "know how" to clean and provide germicidal protection for food utensils, equipment or containers. He is a specialist, too, in cleaning walls, floors, or any part of your plant.

You can have the help of your Wyandotte Representative just for the asking. Why not call him in today?

Wyandotte

REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION • J. B. FORD DIVISION

WYANDOTTE, MICHIGAN

*Service Representatives in 88 Cities*


# ASSOCIATED INDUSTRIES

**American Can Co.'s St. Louis** plant will soon begin peacetime production of cans, according to Carl G. Preis, vice-president. The plant has been engaged in the manufacture of torpedoes for the Navy since March, 1942.

**The Arco Co.,** Cleveland paint manufacturer, is planning the immediate construction of a new two-story research laboratory for the development of improved paints, lacquers, varnishes and new industrial coatings.

**Dr. Camille Dreyfus** has been elected chairman of the board of directors of Celanese Corp. of America, and as such, will continue to act as the chief executive officer of the company. Others elected were: William Cameron, first vice chairman, J. A. Larkin, second vice-chairman, and Harold Blancke, president.

**Enterprise Engine & Foundry Co.,** San Francisco, has appointed H. J. McPeak sales engineer of the Process Machinery Division. The division is building and equipping fish reduction plants as well as mills, presses, cookers and dryers.

**Lester N. Harrison** has been named southeastern district manager of the Votator Division of The Girdler Corp., Louisville, Ky., with headquarters in Charlotte, N. C.

**Monsanto Chemical Co.,** St. Louis, has announced the retirement of Gaston F. DuBois, vice-president and member of the executive committee,

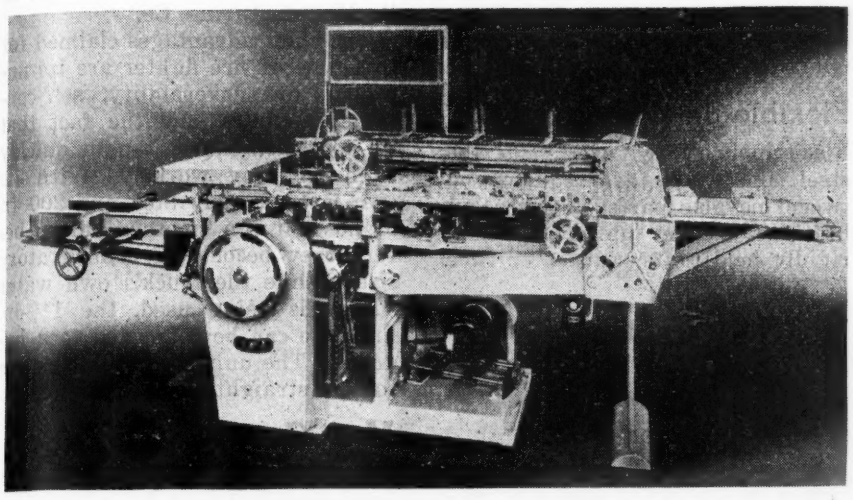
**National Skyway Freight Corp.,** Long Beach, Calif., has appointed John A. Smith as western traffic manager. The company is the west coast's first contract non-schedule air-freight service, with an air cargo capacity of 70,000 pounds.

**Joseph T. Ryerson & Son, Inc.,** Chicago, recently appointed C. S. Hegel as manager of the Special Steels Department.

**The Sperry Corp.,** New York, has entered the automatic packaging industry by purchasing half interest in Wright's Automatic Machinery Co., Durham, N. C. The transaction was announced by Thomas D. Wright, president of Wright's.

**Raymond M. Wilmotte,** director of Wilmotte Laboratory, Inc., Washington, D. C., recently opened a branch laboratory in New York. The laboratory will render complete engineering services in the application of electronics to industrial uses. Paul H. Crago will supervise the new branch.

# FOOD EQUIPMENT NEWS



Completely redesigned wrapping machine.

## Wrapping Machine

PACKAGE MACHINERY CO., Springfield, Mass., has completely redesigned its FA model wrapping machine. The machine now has a variable speed of 40 to 100 packages per minute and wraps either cartons, open boats or flat objects on a cardboard. It is designed for any type of wrapping material in roll or sheet form, and can handle a varied size of package. It occupies less floor space, has a new type of paper feed and new glue pots that are easier to clean and permit the use of any type of glue or Cellulose. It also has new spring-floating heater units, a new and more sensitive paper stop that prevents light packages from tipping, and other improvements.

## Convertible Truck

CONVERSION from one type of load carrier to another has been accomplished by the addition of standard accessories to a basic floor truck, both the truck and accessories being made by Market Forge Co., Garvey St., Everett 49, Mass. The basic truck can be changed into a box truck, leaf truck, shelf truck or any other type of truck shown in the illustration.

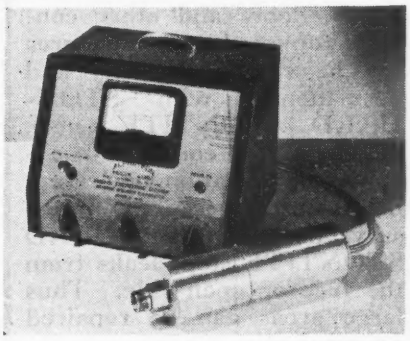
Careful design has kept weight to a minimum. Deep section channels formed in one piece with the truck deck provide a strong chassis capable of carrying up to 5,000 lb., and four additional channel cross-members reinforce the deck.

The running gear of the truck is also changeable, the undercarriage being so designed that any one of six casters and wheel arrangements may be readily applied. Nontilt and tilt types are easily changed from one to the other. Dolly types, wagon types, six wheelers, all may be supplied at the factory or later changed at will by the user. Twelve-inch bull wheels and 6-inch caster wheels, mounted on roller bearings and hardened shafts, are the basic running gear. Rounded corners and edges and a splinter-proof deck eliminate common hazards.

## Ion Vacuum Gage

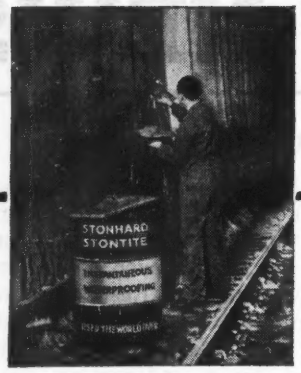
AN all-metal ionization gage with continuous linear response from 0 to 10 mm. of mercury (total pressure) has been placed on the market by National Research Corp., Boston 15, Mass. The ionizing agent is a stream of alpha particles emitted by a radioactive source, which permits operation at any pressure, including atmospheric, without damage to the gage.

The company states that the steady emission characteristic of the radioactive element and advanced amplifier design insure great stability and reduce needle flicker to a minimum. There are three models available, all reading direct pressure. The ranges are from 0 to 0.1 mm., 0 to 1 mm. and 0 to 10



Vacuum gage.

Convertible truck and accessories.




*"Before Winter Comes . . ."*

Leakage and seepage in tanks, elevator pits, reservoirs, basements, floors and other concrete or masonry structures can be stopped quickly and permanently with STONHARD STONTITE, *now*, before winter comes. No expensive excavation or lessening of water pressure is necessary, because STONHARD STONTITE stops leaks from the free or open side. Thus large areas can be repaired economically.

Our TRIAL OFFER

A drum of STONHARD STONTITE will be sent to any company, with the understanding that a good-sized test be made from the drum. If said test fails to do all that we claim it will, we will accept the return of the balance of the material and cancel our invoice.

*Send the Coupon below for the Facts and FREE Literature . . . No obligation.*

**STONHARD CO.**

Building Maintenance Materials

*Serving Industries Since* 1922.

**888 Terminal Commerce Bldg.**

**Philadelphia 8, Pa.**

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Please send us more facts about STONHARD STONTITE.

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MR..... TITLE.....

ADDRESS .....

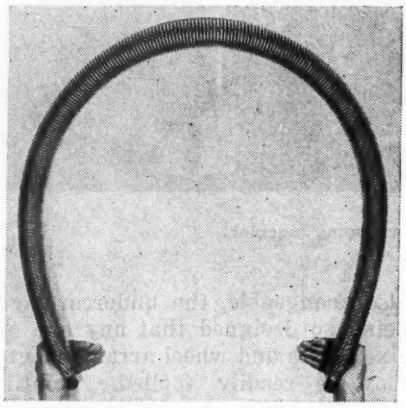
CITY..... ZONE.... STATE.....

mm. Pressures can be read at 1 percent of full scale in each case.

The gage is said to be ideal for measuring pressures of gases other than air—such as argon, water vapor and hydrogen—as the linear response of the instrument holds true regardless of the atmosphere.

## Flexible Steel Hose

FOR applications where flexible steel connections are required between movable parts, or where vibrations are set up between two rigidly held units, Carpenter Steel



**Flexible stainless steel hose.**

Co., Kenilworth, N. J., has placed on the market a flexible steel hose. Manufactured from stainless steel tubing, it can be used for steam connections, as a flexible conduit for wiring, and for intricate connections on lines carrying fluids.

## Factory Fire Engine

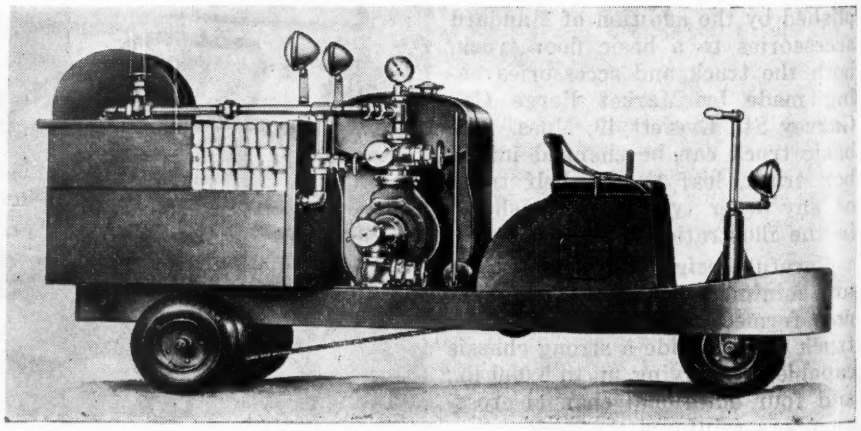
DESIGNED to travel down narrow aisles on a moment's notice and to reach ordinarily inaccessible fires in seconds, the mobile fire fighter illustrated here supplements and often supplants outside help. The gasoline-powered truck is manufactured by Buda Co., Harvey, Ill. It has a 1-ton capacity, 79-in. wheelbase and dual rear wheels. Deck space is approximately 20 sq. ft. and the speed is as high as 15 m.p.h. The fire-fighting equipment on the truck is furnished by F. A. B. Manufacturing Co.

The chief advantages claimed for this type of fire fighter are its unusual maneuverability, self-contained supplies, and the fact that its operation can be taught quickly to nearly any worker. With its own water supply tank and 200 ft. of hose, it can smother flames before they become of conflagratory size. While the truck's own water supply is being used, the 1½-in. fire hose can be connected to a hydrant. The unit has a combination fog or straight-stream nozzle.

## Meat Cutter

A HEAVY-DUTY power cutter has been designed and built by Kent Engineering Co., 124 W. 4th St., Los Angeles 13, Calif. Some of the features of this cutter are a solenoid circuit-type push button; a safety switch for operator protec-

**Heavy-duty meat cutter.**



**Mobile fire extinguisher.**

# THIS IS *Not* THE WAY WOMEN BUY

**Due to rationing, women have become more than ever conscious of quality—they look for it in the product and appreciate a package that fully protects against air, moisture, grease and odors. Such a package is Royal's "FLAV-O-TAINER", the patented duplex flexible container that is heat-sealed on all seams and lined with air and moisture resistant films, providing superior protection.**

## "FLAV-O-TAINER"

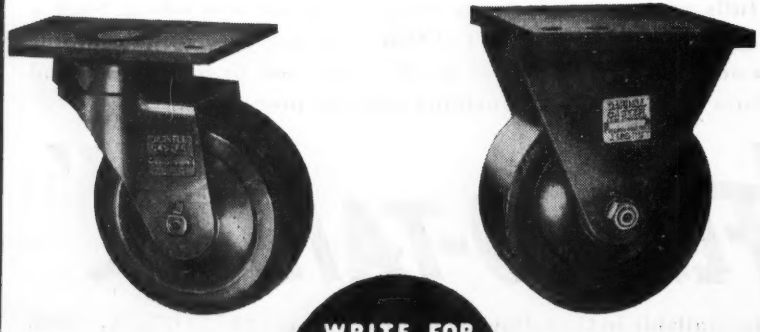
**—to be available in the following Royalflex films—SELLOFLEX, which is Cellophane laminated to itself or to other appropriate material; LUMINEX, aluminum foil laminated to another appropriate material; PLIOFLEX, pliofilm laminated to itself or appropriate material; DIOFLEX, moisture proof coated glassine laminated to itself.**

**THOMAS M. ROYAL & COMPANY • *Philadelphia 20***

# DARNELL CASTERS

## & E-Z ROLL WHEELS

*Whether for light, medium or heavy duty use, Darnell Casters and Wheels are built to take punishment.*



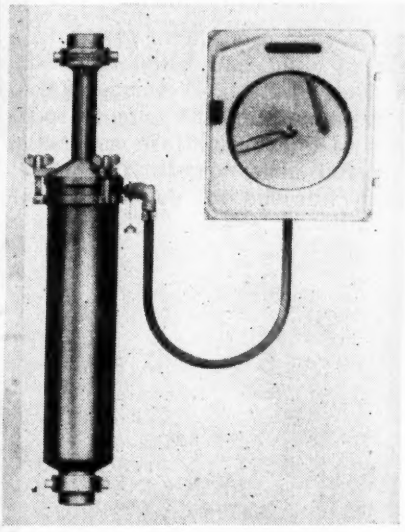
WRITE FOR **FREE** DARNELL MANUAL

DARNELL CORP. LTD. 60 WALKER ST. NEW YORK 13 N.Y.
LONG BEACH 4 CALIFORNIA 36 N. CLINTON CHICAGO 6 ILL.


tion; 14-in., fully machined wheels, harmonically balanced to eliminate vibration and noise; a new type of cutting gage that automatically locks into position for fast cutting; ball bearings throughout; a heavy-duty, oversize, enclosed motor; and a free-wheeling stainless steel sliding table. An axially balanced heavy base houses the motor and drive mechanism.

### Sanitary Rotameter

FOR controlling and totalizing flows of sanitary fluids, such as milk or cream, Fischer & Porter Co., 925-R County Line Rd., Hatboro, Pa., announces a sanitary Rotameter with electric transmission. It is made entirely of polished stainless steel,



**Sanitary rotameter.**

and the flow is straight through the meter from bottom to top. There is said to be no pockets in this meter in which dirt or germs can collect. Loosening three wing nuts at the center of the meter instrument permits it to be taken apart into four pieces for easy cleaning. It is supplied with standard sanitary connections and is built in several sizes ranging from 1,000 to 150,000 lb. of milk per hour.

### $CO_2$ Ice Liquefier

SOLID CARBON DIOXIDE is transformed into liquid form by a liquefier developed by Mathieson Alkali Works, 60 East 42nd St., New York 17. This development is to assist bottlers of carbonated beverages and other users of carbon dioxide. The unit consists essentially of a tank, 6 ft. 8 in. high and 34 in. in diameter made of special steel and welded throughout. It has a capacity of 20 full-sized blocks, or

# *Is your container dated "Button-Shoe" era?*

ARE YOU selling an improved product in a "button-shoe" era package?

This is something to think about.

Your product is better today than it was years ago. For, like most progressive manufacturers, you've improved it over the years. And now that the war is over you may be considering further improvements. BUT—

### Will your container do the job?

In the competitive days ahead, will your package match your product improvements? Is it economical and efficient? Is it interesting enough to make people point to it and say, "I want *that* one"?

This is the time to plan your postwar packaging. Why not get the latest packaging information *now?*

### We're here to help you

We believe we have the answer to your packaging problems. We're ready to devise new eye-appealing containers that will go to bat for you economically and efficiently.

Our past experience will aid you with *your* packaging problems.

We can help you, as we've helped others. Just ask our representative or write us direct.

## AMERICAN CAN COMPANY

*230 PARK AVENUE* CANCO *NEW YORK 17, N. Y.*

**World's Largest Manufacturers of Fibre and Metal Containers**

## LET GRAVITY AND "RAPID-WHEEL" DO YOUR WORK

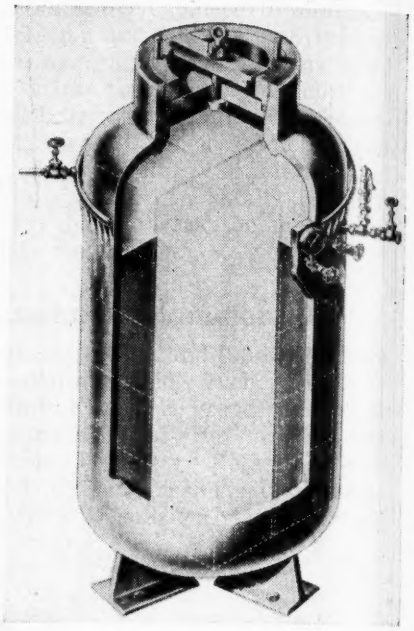
Here's a way to cut your handling costs . . . to get more done faster with less help. Rapid-Wheel Portable Conveyors pay for themselves quickly . . . and pay you a profit for years to come. Light in weight, easy to handle and simple to assemble, they can be moved about to fit changing needs. There is a model to suit your particular need.

Better telephone, write or wire **NOW!** for further information. It may be the most profitable few moments you ever spent.

Sections can be coupled together easily in a second's time.

# THE RAPIDS-STANDARD CO., INC.

Sales Division — 361 Peoples National Bank Building — Grand Rapids 2, Michigan



**Solid $CO_2$ liquefier.**

1,000 lb., of $CO_2$ ice. The use of uncrushed blocks of $CO_2$ ice is said to save labor and reduce evaporation loss.

The liquefier is equipped with safety pressure-relief devices, is engineered according to A.S.M.E. specifications and carries the approval of the Hartford Steam Boiler Inspection and Insurance Co.

The unit is charged with blocks of $CO_2$ ice through the 15-in. circular opening at the top. It is then closed, water is run down the outside surface from a perforated ring near the top, and the liquefier is ready for operation.

Some of the special features claimed for the liquefier are large capacity, absence of moving parts, long life of the special molded gasket due to easy operation of the closure head, and operation without compressor and refrigeration unit.

### Dial Thermometer

BIMETALLIC helical-coil measuring elements are featured in a new dial thermometer marketed by Equipoise Controls, 342 Madison Ave., New York 17. The element is said to be permanently calibrated, producing a highly accurate unit.

The thermometer is encased in 18-8 stainless steel and has unbreakable glass crystal.

Various standard ranges are available between –90 and 1,000 deg. F., and test or laboratory thermometers may be had with both centigrade and Fahrenheit scales. Dial sizes are 2, 3 and 6 in.

# CATALOGS, BULLETINS

## FOOD PLANT EQUIPMENT

**Filters**—Oliver United Filters, Inc., 33 West 42nd St., New York 18, has published an 8-page catalog on various types of filters. Included are continuous vacuum, continuous pressure and batch pressure filters.

**Corrosion Resisting Valves**—Corrosion resisting valves are described and illustrated in a 20-page booklet just issued by Wm. Powell Co., 2503 Spring Grove Ave., Cincinnati 22. The booklet covers the various types of valves, such as globe, angle, gate, check, Y, needle, relief and flush-bottom.

**Fractional-horsepower Drives**—Specifications and price list for fractional-horsepower wedge-belt drives are given in a catalog just issued by the American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa., Dept. 621. This new catalog also contains 4 pages of condensed and simplified drive tables for a wide range of center distances and drive ratios.

**Blast Freezing**—Blast freezing of foods is described in a 16-page illustrated brochure published by Carrier Corp., Syracuse 1, N. Y. Detailed descriptions are given of Carrier's standard units, suspended blast freezers, floor-mounted blast freezers, freezing systems for special needs, refrigeration machines and evaporative condensers.

**Axial-flow Blowers**—A condensed description and a typical performance curve of the turbine-type axial-flow, high-pressure fan and blower is given in a 4-page leaflet distributed by Buffalo Turbine Corp., 2165 Bailey Ave., Buffalo 11, N. Y.

**Processing Equipment**—Evaporators, heat exchangers, condensers, and other processing equipment are described in an 8-page bulletin just issued by Union Iron Works, Erie, Pa. The booklet describes and illustrates many features of the equipment.

**Variable-speed Drives**—Variable-speed drives are described and illustrated in a booklet issued by the Worthington Pump & Machinery Corp., Harrison, N. J.

**Magnetic Pulley**—How to select a magnetic pulley is told in a 32-page catalog issued by Dings Magnetic Separator Co., 509 East Smith St., Milwaukee, Wis. In it are included tables, capacities, dimensions and specifications of the various types of magnetic pulleys offered.

**Valve Information**—Interesting, instructive and valuable information on valves—their selection, design, construction, application and care—is presented in a booklet recently printed by Wm. Powell Co., 2503 Spring Grove Ave., Cincinnati 22, Ohio.

**Pumps**—Numerous photographs of a diversity of pumps are shown in a 32-page booklet recently published by Deming Co., Salem, Ohio. Descriptions and illustrations of installations are included.

## PLANT SUPPLIES

**Stainless Steel Sheets**—Uses of stainless steel in handling and processing foods are shown pictorially in a very complete 96-page handbook issued by Eastern Stainless Steel Corp., Baltimore 3, Md. The first 34 pages are devoted to a pictorial review of the importance of stainless steel in the various industries. Following this is an informative section entitled "Why Stainless Steel Resists Corrosion." At least one page is devoted to each grade of stainless produced by the company, with appropriate applications for each type. Extensive data on gages, sizes, tolerances and finishes are given, and there is a section on processing and fabrication.

**Rubber Adhesives**—Natural and synthetic rubber adhesives manufactured by B. F. Goodrich Co., Akron, Ohio, are described in considerable detail in a booklet issued by the company. The new publication tells how to choose the right kind of cement for various applications, and contains a table giving data on cement weights, colors and base materials.

**Water-resistant Tape** — McLaurin-Jones Co., Brookfield, Mass., has prepared a little booklet describing waterproof sealing of fiberboard containers for overseas shipment.

**Directory of Products**—The Allis-Chalmers Mfg. Co., 565, Milwaukee 1, announces a comprehensive, 32 page directory of products describing its lines of equipment. A part of the directory is devoted to engineering subjects and contains operating data, charts, formulas and technical information of value to the man who specifies and buys equipment.

**Centralized Lubrication**—Advantages of the centralized lubricating system when installing equipment for post-war operations are pointed out in an illustrated 4-page folder entitled "When You Reconvert," issued by Farval Corp., Cleveland, Ohio.


*For accurate data on FLAVOR*

**an authoritative study of**

**—what flavor is**

**—how we smell, taste and "feel" it**

**—how flavor is used, tested, and evaluated**

HERE is the first comprehensive, specialized treatment of flavor, gathering together material on every aspect of taste and color—its language, its chemistry, its psychology, and its commercial significance. Pioneering a new field in food technology, the book includes practical as well as theoretical material, and represents the most recent advances in flavor research.

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***172 pages, 5½ x 8½, $2.50***

THE book contains a philosophy of flavor, and discussing in turn each of the complex sensory elements of tongue taste, smell, and feeling, develops a practical psychology of flavor perception. It explains fully the physiology of flavor receptors, and the means for stimulating or repressing them to attain desired flavor objectives.

**Practical data for food technologists**

Gives you detailed discussion of the chemistry of flavoring agents, spices, etc., and methods for developing and retaining them in food and other products, and describes how flavor is influenced by texture, temperature, freezing, dehydration, and other processes. Outlines methods for prevention of undesirable or off-flavors in commercial products, and gives tests for judging and scoring flavor quality in dairy products, meats, ice cream, bread, cake, etc.

**Now, a book that offers:**

- a new and unique odor classification system by which each odor is classified by a four-digit number, each digit indicating the relative concentration of the four types of odor components.
- analysis of volatility as a factor in blending, evaporation control, fixation, etc.—with Tables of Chemicals Arranged in Fourteen Groups According to Volatility at 20° C.
- detailed suggestions for proper laboratory techniques for smelling and tasting specimens for flavor quality.

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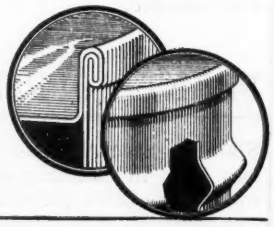
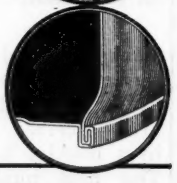


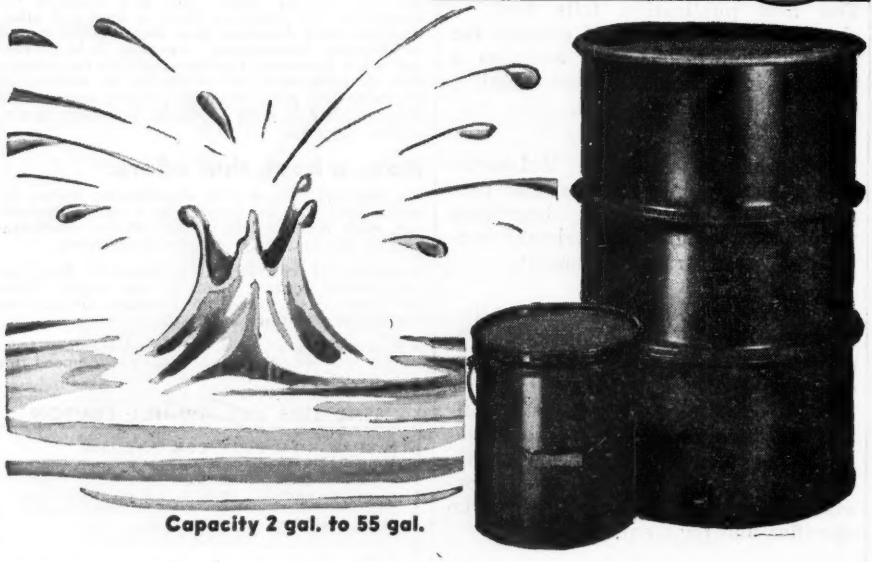
These V-shaped rolling hoops do not flatten out or dent easily.

Section through lug type closure that is liquid-proof, airtight and sift-proof.

Protection bead on pails adds materially to its strength and utility.

Offset bottom, an important design feature of all Inland Steel Container pails permits containers to be stacked and rolled together.





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## CONTROL EQUIPMENT

**Feed Water Regulators**—An 8-page bulletin, No. 83-C, entitled "Bailey Thermo-Hydraulic Feed Water Regulators," has been issued by Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10. It describes and illustrates improved designs of thermo-hydraulic generators and bellows-operated feedwater regulator valves, suitable for feed lines, ranging in size from ¾ in. to 6 in. A full-page colored schematic illustration demonstrates the thermo-hydraulic principle, which requires no outside source of power.

Also available is Bulletin 62 describing open-channel meters for industrial wastes, sludge, irrigation water, or liquids with solids in suspension.

**Flow-rate Measurement**—"A New Era in Flow Rate Measurement" is the title of a new 32 page bulletin just issued by Fischer & Porter Co., 92507-C, County Line Road, Hatboro, Pa. The various advantages of the rotameter line are analyzed and fully discussed and illustrated.

## MISCELLANEOUS

**Light Reflecting Floors**—"Light from Floors" is the name of a revised edition of a 24-page book issued by Universal Atlas Cement Co., Chrysler Bldg., New York. Information concerning a comprehensive survey made by General Electric Co., involving more than 300 lighting tests, is covered in the new book. Data also are offered to show that white cement floors are easy to keep clean and encourage cleanliness.

**Reconversion Inventory**—A series of bulletins have been issued by Allis-Chalmers Co., Milwaukee, Wis., giving the highlights on how to take a reconversion inventory of various items. One covers electric motors, another V-belt drives, and another centrifugal pumps. Each of the bulletins gives specific instructions, together with check lists which cover the important characteristics of each piece of equipment to be noted.

**Gravity Conveyor** — Lamson Corp., Syracuse 1, N. Y., has just issued a 4-page bulletin illustrating its lightweight portable gravity conveyor.

**Salad Dressing Production** — The food starch division of National Starch Products, Inc., 270 Madison Ave., New York 16, has compiled a handbook of facts on the production of salad dressing. The purpose of the book is to outline general procedures. It discusses in general terms how to make starch paste and how to prepare the other ingredients.

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## . . . when the Problem is Piping Equipment

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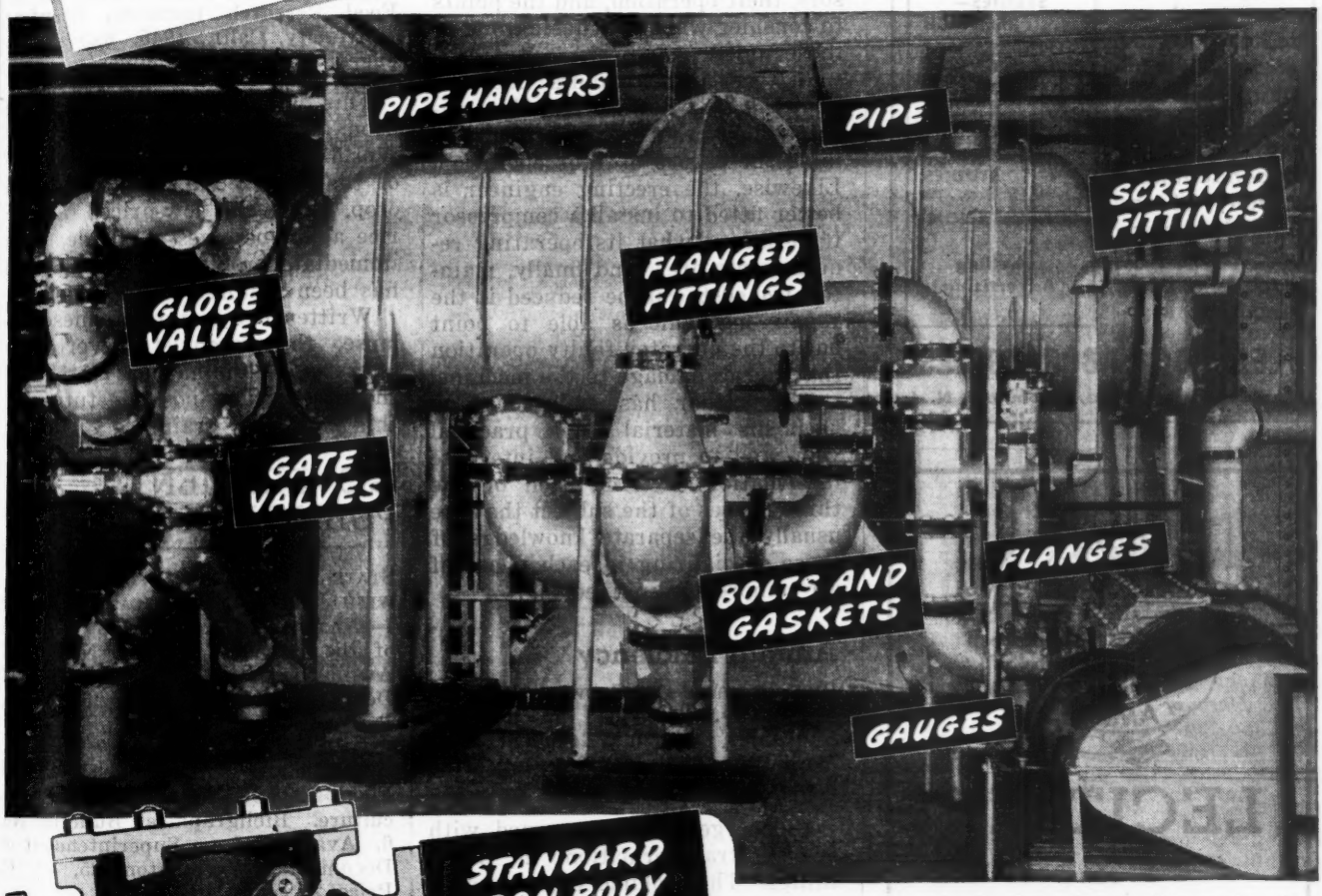
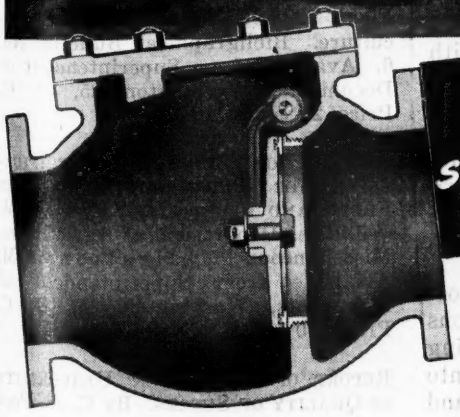
ONE RESPONSIBILITY
ONE STANDARD OF QUALITY

You're better assured of getting what you need, when you depend on this ample source—your Crane Branch or Wholesaler. You choose from the world's greatest line of piping materials—in brass, iron, and steel. You know that all materials are uniform in quality with one responsibility behind them. Keep this Crane *complete* service in mind to simplify and speed up deferred replacement work—and to keep piping at peak efficiency. For a typical Crane solution to many of your check valve needs, see below.




*Condensing unit in food processing plant*



STANDARD IRON BODY SWING CHECK VALVES

**SERVICE RECOMMENDATIONS:** ***Crane Standard Iron Body Swing Check Valves*** are suited for many services in food packing and canning plants, at all working pressures up to 125 pounds steam, 200 pounds cold water, oil or gas. Brass trimmed valves are recommended for steam or water, or for fluids non-corrosive to brass; all-iron valves for fluids that corrode brass but not iron. Available with screwed, flanged or hub ends in all practical sizes 2 inches and up. See your Crane Catalog for full specifications.

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# BOOKS

## Food Engineering

AIR COMPRESSORS. By Eugene W. Feller. Published by McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, 1945. 5¼x8½ in.; 460 pages; cloth. Price, $4.50.

The best procedures in the installation, operation and maintenance of air compressors are presented in this carefully written book intended for operational and mechanical engineers. Through it the food plant engineer can become familiar with all types of compressors, their operation, and the points to consider when purchasing one of these units.

As the author points out, the knowledge of how to install a machine helps the operator to determine the causes of poor operation. Likewise, the erecting engineer is better fitted to install a compressor if he knows what its operating requirements are. And finally, maintenance costs can be reduced if the repair mechanic is able to point out to the operator faulty operation that causes damage to the machine.

The author has endeavored to keep his material in a practical vein, and to provide and integrate information covering each of the three phases of the subject that are usually the separate knowledge of those specializing in each phase of air compressor engineering.

## Animal Efficiency

BIOENERGETICS AND GROWTH. By Samuel Brody. Published by Reinhold Publishing Co., 330 W. 42nd St., New York 19, 1945. 6¼x9¼ in.; 1023 pages; cloth. Price, $8.50.

Bioenergetics is concerned with energy transformation in living things. This volume represents an attempt to integrate some physiologic and economic factors influencing the efficiency of this agricultural process, such as those involved in the production of meat, milk, eggs and muscular work.

The book includes such important food industry considerations as the energy cost of maintaining animals, of transforming feed into body tissue, meat, milk, eggs and other desirable products, the relation of the speed with which these transformations occur to the efficiency of the process, the influence of the size of the producing animal on the efficiency and profit of the productive enterprise, and the influence on the rate of process on the rate of aging. Many of the factors influencing efficiency, such as enzymes, minerals, vitamins and hormones, are analyzed.

While the book might be said to be addressed primarily to the agricultural chemist, its pages, though technical to a degree, should not be beyond the resources of the executive concerned with the production of meat, dairy products and eggs.

## Rice Boom

RICE IN THE WESTERN HEMISPHERE. By V. D. Wickizer. Published by Food Research Institute, Stanford University, Calif., 1945. 6x9 in.; 48 pages; paper. Price, 50 cents.

This is an analysis of the one boom grain crop brought on by World War II. What is to become of the greatly expanded American crop, when the low-priced Asiatic rice again becomes available, is an immediate problem now that peace has been restored in the Pacific.

Written before the Japanese collapse, the pamphlet nevertheless offers an illuminating picture of the present and possible future of this important grain.

# GOVERNMENT PUBLICATIONS

STATE LABOR LAWS FOR WOMEN—WITH WARTIME MODIFICATIONS. Part I—Analysis of Hour Laws. Bulletin of the Women's Bureau, No. 202-I. Available from Superintendent of Documents, Washington 25, D. C. Price, 15 cents.

BIBLIOGRAPHY ON DEHYDRATION OF FOODS 1938-43. Department of Agriculture. Bibligraphical Bulletin No. 6. Available from Superintendent of Documents, Washington 25, D. C. Price, 20 cents.

OUTLINE OF SUGGESTED SPECIFICATIONS FOR PURCHASING PROCESSED FRUITS AND VEGETABLES. By Paul M. Williams. Department of Agriculture, Miscellaneous Publication 562M. Available from Superintendent of Documents, Washington 25, D. C. Price, 10 cents.

REPORT OF STUDIES ON UNIFORMITY OF QUALITY OF SUGARS. By C. A. Fort and others. Bureau of Agricultural and Industrial Chemistry. AIC-93. Mimeographed. Free, from Bureau.

DRIED MILKS. By George E. Holm. Bureau of Dairy Industry. BDIM-Inf-25. Mimeographed. Available (free) from Bureau of Dairy Industry, Washington 25, D. C.

# PATENTS

### BAKING

**Bakery Dough Mechanically Shaped to Desired Thickness During Passage Under Roller Set Obliquely to Path of Travel on Conveyor** — Morris Cohen, Kansas City, Mo., and Duard W. Enoch, George Hasty and Gerald A. Jorgenson, Chicago, Ill., to Interstate Bakeries Corp., Kansas City, Mo. No. 2,383,774. Aug. 28, 1945.

### BEVERAGES

**Dry Extract Made From Roasted and Ground Coffee** — Richard Huguenin, Stamford, Conn., to Inredeco, Inc., Panama City, Panama. No. 2,380,046. July 10, 1945.

**Water-soluble Cocoa Bean Extract Made From Broken and Non-adherent Cocoa Bean Nibs**—Hans Konrad Durrenmatt, Maryville, Ohio, and Jean de Schoulepnikow, Glenbrook, Conn., to Inredeco, Inc., Panama City, Panama. No. 2,380,158. July 10, 1945.

### CEREALS

**Nutritional Value of Hulled Rice Improved by Treating To Raise Vitamin $B_1$ Content**—Max Frank Furter, Upper Montclair, N. J., to Hoffmann-La Roche, Inc., Nutley, N. J. Nos. 2,381,342 and 2,381,343. Aug. 7, 1945.

**Rice and Similar Grains Shelled During Passage Through Pair of Spaced Rollers**—Eloir Polite Miller, El Campo, Tex. No. 2,381,507. Aug. 7, 1945.

### CONFECTIONERY

**Chocolate Confection Given Temperature Resisting Property by Cold Working Chocolate and Sugar Mixture at Temperature Not to Exceed Approximately 83 Deg. F. and Compressing to Form Solid Dense Block**—Raymond W. Crosley and Herbert W. Connor, to Wm. Wrigley, Jr., Co., Chicago, Ill. No. 2,384,077. Sept. 4, 1945.

### DAIRY

**Butter Mechanically Worked in Machine Designed to Load and Unload on Continuous Basis**—Albert C. Houghland and Glen S. Houghland, New York, N.

**Ice Cream and Similar Frozen Foods Given Predetermined Form by Mold With Hollow Tapered Core**—Bartram H. Moore, Doylestown, Pa. No. 2,384,041. Sept. 4, 1945.

### FATS AND OILS

**Fatty Glyceride Treated With Low-molecular-weight Monohydric Alcohol in Presence of Methyl Alcohol**—Emil Edward Dreger, Summit, N. J., to Colgate-Palmolive-Peet Co., Jersey City, N. J. No. 2,383,596. Aug. 28, 1945.

**Fatty Glyceride Containing Free Fatty Acid Treated With Lower Aliphatic Monohydric Alcohol for Separation of One Phase Containing Free Fatty Acid Preparatory To Adding to Catalyst to Fatty Glyceride Phase To Obtain Reaction Between Fatty Glyceride and Alcohol**—Glenn Ashmore Glossop, New York, N. Y., to Colgate-Palmolive-Peet Co., Jersey City, N. J. No. 2,383,599. Aug. 28, 1945.

**Fatty Glyceride Containing Free Fatty Acid Treated With Low-molecular-weight monohydric Alcohol in Presence of Acidic Esterification Catalyst Preparatory to Treatment With Low-molecular-weight Monohydric Alcohol in Presence of Alkaline Neutralizing Agent for Formation of Alcoholic Esters and Glycerine** — Gerald Inman Keim, Newark, N. J., to Colgate-Palmolive-Peet Co., Jersey City, N. J. No. 2,383,601. Aug. 28, 1945.

**Fatty Glyceride Treated With Low-molecular-weight Monohydric Alcohol in presence of Alkaline Alcoholysis Catalyst To Form Alcohol Esters and Glycerine**—Gerald Inman Keim, Newark, and John Ross, Ramsey, N. J., to Colgate-Palmolive-Peet Co., Jersey City, N. J. No. 2,383,602. Aug. 28, 1945.

**Fatty Glyceride Treated With Monohydric Alcohol To Give Mixture of Esters, Glycerine and Partially Reacted Glyceride and Further Treated for Removal of Esters and Glycerine and Reworking of Partially Reacted Glycerides**—Joseph Henry Percy, New York, N. Y., to Colgate-Palmolive-Peet Co., Jersey City, N. J. No. 2,383,614. Aug. 28, 1945.

**Fatty Glycerides Treated With Low-molecular-weight Monohydric Alcohol To Form Mixture of Fatty Acid Esters, Glycerine and Unreacted Alcohol, Followed by Volatilization of Alcohol and Separation of Esters From Glycerine**—Walter Russell Trent, North Arlington, N. J., to Colgate-Palmolive-Peet Co., Jersey City, N. J. No. 2,383,632. Aug. 28, 1945.

**Fatty Glyceride Treated With Monohydric Alcohol in Presence of Alkaline Alcoholysis Catalyst To Produce Mixture of Fatty Acid Esters, Glycerine and Unreacted Alcohol, Followed by Volatilization of Unreacted Alcohol, Acidification of Residue and Separation of Esters From Glycerine**—Walter Russell Trent, North Arlington, N. J., to Colgate - Palmolive - Peet Co., Jersey City, N. J. No. 2,383,633. Aug. 28, 1945.

**Fat-soluble Vitamin Concentrate Extracted From Fish Oils by Solvents From Group Consisting of Aliphatic and Alicyclic Monohydroxy Alcohols**—Bernard A. Dombrow, New York, N. Y., to National Oil Products Co., Harrison, N. J. No. 2,380,418. July 31, 1945.

**Oil Recovered From Rapidly Perishable Animal Protein Material by Treating With Alcohol, Holding Until Substantially Digested and Removing the Liberated Oil**—Charles W. Kaufman, Hasbrouck Heights, N. J., to General Seafoods Corp., Boston, Mass. No. 2,380,847. July 31, 1945.

**Oils With High Iodine Value Made From Fish Oils** — Loran O. Buxton, East Orange, N. J., to National Oil Products Co., Harrison, N. J. No. 2,380,412. July 31, 1945.

**Soap and Fatty-acid-free Fish Oil Extracted With Organic Polar Solvent To Remove Undesirable Odor, Taste and Color Constituents**—Loran O. Buxton, Newark, N. J., to National Oil Products Co., Harrison, N. J. No. 2,380,411. July 31, 1945.

**Vitamin-containing Fish Oil Hydrogenated To Improve Taste and Odor**—Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,380,408. July 31, 1945.

### MEAT, FISH, POULTRY

**Meat Masses Mechanically Slitted Into Units of Predetermined Size**—Joseph P. Spang, Quincy, Mass., to Cube Steak Machine Co., Boston, Mass. No. 2,380,371. July 10, 1945.

**Tough Animal Tissue Potentially Tenderized by Soaking About 25 Minutes in Tartaric Acid Solution of pH 2.24 at Room Temperature**—Joseph Epst, Chicago, Ill. No. 2,381,813. Aug. 7, 1945.

### MISCELLANEOUS

**Apples Mechanically Sliced at Low Production Rate by Manually Operated Unit**—De Soto E. Richardson, Wenatchee, Wash. No. 2,383,814. Aug. 28, 1945.

**Homogenous Gel Made by Treating Ammonium, Sodium or Potassium Pectate With Lactone Reactive With Water**—Lacey H. Evans and Louis J. Huber, Minneapolis, Minn., to General Mills, Inc. No. 2,380,739. July 31, 1945.

**Materials Containing Nucleic Acid Radical Extracted and Further Treated**


# Imagine You

## WEARING AN ASPHALT RAINCOAT!

● Probably you'd look terrible. But one thing is sure —you'd stay *dry!* For asphalt keeps out moisture. And that's why we use asphalt to help keep Diamond Crystal Salt dry, and prevent caking.

Salt usually cakes in excessive humidity, because moisture condenses on salt particles, forming a thin layer of brine. Then, in dry weather, the brine evaporates and the crystals knit together.

Our research laboratory has found a number of ways to help prevent salt caking. Removal of moisture-attracting impurities, such as calcium chloride, helps. So does complete removal of fines by careful screening. Most important is to provide salt with a moisture- and vapor-resistant package.

Take our Flour Salt bag, for example. It is composed of three 50-lb. and two 25-lb. sheets of kraft, laminated together with 40 lbs. of asphalt per ream. That's a lot of asphalt, and it costs us more money—but our moisture-vapor transmission tests show this bag is worth the extra cost. The bag is even sewn with *waxed thread* to seal the holes made by the sewing-machine needle. That's real *protection*—one reason we have been able to eliminate caking as a major problem!

**Want Free Information On Salt? Write Us!**

If *you* have a salt problem, write our Director of Technical Service. He will be happy to help! Diamond Crystal Salt, Dept. J-13, St. Clair, Mich.

**DIAMOND CRYSTAL** ALBERGER PROCESS **SALT**

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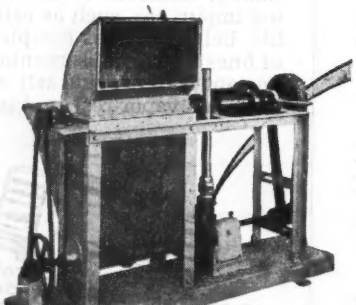
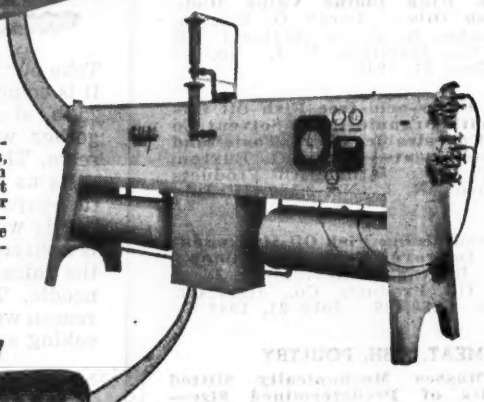
*By CRCO-American Insures Highest Quality and Maximum Recovery*

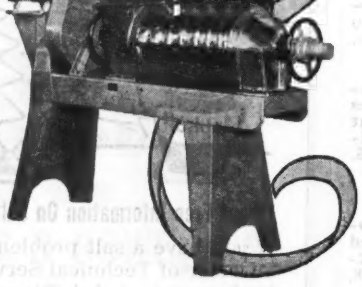
**With CRCO equipment throughout, packers of Tomato Juice can secure a higher quality, greater recovery of juice, better color . . . and all of these with less man hours and lower maintenance costs. There is the right piece of CRCO equipment for every part of the line . . . from the Washer to the Labeler and Caser.**



CRCO-American Chopper Pumps, consisting of Chopper, Tank and Force-Feed Pump, permit more efficient heating and a greater recovery of juice . . . the best method of moving the product.



CRCO-American Pre-Heaters for chopped tomatoes, pulp or juice operate with continuous feed without overheating, burning-on or scorching. Automatic controls take care of all change in volume of flow or overloads.



CRCO-American Extractors give from 75% to 90% recovery of juice at capacities up to 60 gallons per minute. No whipping or beating, hence no harmful aeration of product.

Will not break seeds at maximum recovery.

THE BEST OF Everything

**CHISHOLM-RYDER CO. INC.**

Niagara Falls, New York

FOR THE FOOD PROCESSOR


**With Source of Cuprous Ions for Recovery of Rare Sugars**—Louis Lauter and Jesse Charney, to Schwarz Laboratories, Inc., New York, N. Y. Nos. 2,379,913 and 2,379,914. July 10, 1945.

**Natural Water-soluble Gum and Pectin Made Into Stable Aqueous Solution**—Herbert T. Leo, Clarence C. Taylor and John W. Lindsey, Anaheim, Calif., to Mutuel Citrus Products Co., Anaheim, Calif. No. 2,380,115. July 10, 1945.

**Protein Recovered From Aqueous Waste Material by Mixing With Finely Divided Solid Calcium Metaphosphate, Digesting to Form Protein Phosphate Complex and Separating by Precipitation** — Eugene R. Rushton, Florence, Ala., to Tennessee Valley Authority. No. 2,379,929. July 10, 1945.

**Soya Meal and Granules From Aleurone Layers of Wheat Made Into Homogeneous Mixture High in Protein Content and Vitamins and With Improved Taste Characteristics Over Soya Products**—Arnold A. Kaehler, Red Wing, Minn. No. 2,379,441. July 3, 1945.

**Water Suspension of Liver Made To Contain At Least 200 Parts Per Cubic Centimeter of Liver Solid and Riboflavin Content in Excess of That Held in Solution**—Robert S. Shelton, Mariemont, Ohio, to Wm. S. Merrell Co. No. 2,379,644. July 3, 1945.

**Yeast Grown on Low-sugar Mash With Aeration to Produce Glycerol**—Howard M. Hodge, Linthicum Heights, Md., to U. S. Industrial Chemicals, Inc. No. 2,381,052. Aug. 7, 1945.

**Vitamin C Precipitated as Magnesium Salt From Fruit Juices Preparatory to Separation, Acidification, Recovery of Vitamin C in Solution and Concentration** — Ryo Yamamoto and Takeshi Hara, Taiwan, Japan, to Alien Property Custodian. No. 2,383,902. Aug. 28, 1945.

## PACKAGING

**Food Packaged in Container Constructed to Possess Self-heating Means**—Walter Anderson Caldwell, Seamill, Scotland, to Imperial Chemical Industries, Ltd. No. 2,384,278. Sept. 4, 1945.

**Milk Under Partial Vacuum Filled Into Series of Containers Having Air-tight Closures** — Hector Murdoch McDonald, Meeniyan, Gippsland, Victoria, Australia. No. 2,380,771. July 31, 1945.

**Plurality of Sticks of Gum Individually Wrapped and Packaged in Outer Wrapper in Manner That Permits Withdrawal of Individual Sticks Without Remaining Sticks Losing Their Vertical Position or Outer Wrap Collapsing**—Willet B. Ranney to William Wrigley, Jr., Co., Chicago, Ill. No. 2,380,367. July 10, 1945.

### Canadian Patents

**Starch Modified by Partly Etherifying Hydroxy Groups in Molecule With Sodium Salt of Glycolic Acid and Partly Esterifying Them With Sodium Acid Sulphate**—Paul Karrer, Zurich, Switzerland, to Hoffmann-La Roche, Ltd., Montreal, Quebec, Canada. No. 428,839. July 17, 1945.

**Lactoflavin Concentrate Derived From Milk Mixed With Rice Polish Extract Concentrate in the Ratio of 2 to 15 Parts of Vitamin $B_1$ to 2 to 20 Parts of Lactoflavin and 25,000 to 300,000 Parts of Rice Polish Concentrate**—George C. Supplee and Raymond C. Bender, Bainbridge, New York, N. Y. No. 428,893. July 17, 1945.

**Milk Treated With Mixture of Acetone and Water For Separation of Lactose Mixture Containing About 40 Percent Alpha Lactose and About 60 Percent Beta Lactose**—George E. Flanigan and George C. Supplee, Bainbridge, New York, N. Y. No. 428,849. July 17, 1945.

**Wheat Grains Treated With Solution Containing Sulphurous Acid in Proportions to Permit Separation of Gluten and Starch From Each Other by Sedimentation After Grinding To Form Watery Slurry**—Cecil T. Langford and Richard L. Slotter, Peoria, Ill. No. 428,900. July 24, 1945.

# FOOD TECHNOLOGY

## NEW DISCOVERIES AND INVENTIONS

## FERMENTATION

### Nutrients for Yeast Fermentation

OUT of simple substances—potassium, magnesium, phosphate and sulphate ions, the vitamins thiamine, pyridoxine and nicotinic acid, sugar, yeast-available nitrogen and a citrate buffer—technicians have developed a medium that will support yeast fermentation at a rate as high as will flour fortified with an excess of sugar and available nitrogen. No previous completely synthetic, and hence "known," mixture would do this.

With all the ingredients present, the curve for gas evolution for the synthetic medium lies slightly above but parallel to that for flour paste plus salt and asparagine. With any one of the required substances absent the curves lie below the control, usually showing none of the characteristic acceleration. When each ingredient is added separately to a sugar solution, there is no effect. Thus it is shown that each is required in conjunction with all the others.

All of the essential substances are constituents of flour.

Digest from "Influence of Dough Constituents on Fermentation," by L. Atkin, A. S. Schultz and C. N. Frey, *Cereal Chemistry*, vol. 22, 321-33, July, 1945.

## DAIRY

### Vitamin C in Milk

EVAPORATED MILK which is fortified with vitamin D may be further improved as a nutritional medium by the addition of vitamin C to bring the product up to the level of 100 mg. per liter (reconstituted basis).

There is some loss during processing, but thereafter the loss is only slow, the rate comparing very favorably with the loss in canned fruit juices which are considered a good source for this vitamin.

Since it has been found that the ascorbic acid present is relatively stable in infant formulas prepared from the fortified milk, it should be of use for that purpose.

When ascorbic acid is added, the protein breakdown during processing is accelerated, but the use of sodium citrate or disodium phosphate will correct this, as will the use of l-ascorbate as the fortifying material.

Nitrogen or vacuum sealing is required. The reducing substances naturally produced by the heat during processing help to stabilize the vitamins.

Digest from "Ascorbic Acid in Evaporated Milk," by D. V. Josephson and F. J. Doan, The Pennsylvania State College School of Agriculture Experiment Station, Bulletin No. 473, April, 1945.

## STORAGE

### Rot Control

THIOUREA has proved effective as a dip in controlling stem-end rot and mold of oranges, for which the causative organisms are *Phomopsis citri, Diplodia natalensis, Penicillium digitatum* and *Penicillium italicum.*

The amount of thiourea which might be ingested from treated fruits is much below the lowest dose mentioned in toxicity studies, but prolonged feeding tests must be made before recommendation for its use is possible.

Search for less objectionable compounds has developed the fact that the presence of both sulphur and the amino group is required in an effective agent. Compounds also found effective, but not yet tested for toxicity, are thioacetamide, 8-hydroxyquinoline sulphate and 2-aminothiazole, all in 5 per cent solution.

Digest from "Compounds for Control of Orange Decays," by J. F. L. Childs and E. A. Siegler, *Science*, vol. 102, 68, July 20, 1945.

## CEREAL PRODUCTS

### Nitrogen Gases In Flour Bleaching

NITROGEN TRICHLORIDE is widely used as a flour bleach, but it has an adverse effect on the baking characteristics of certain types of flour. For these, an extra quantity of benzoyl peroxide must be used to secure the desired color removal. Benzoyl peroxide is expensive.

Nitrogen peroxide is in itself a less effective bleaching agent than the trichloride, but it is cheap and without measurable effect on the baking characteristics. It is effective when used as the second of two gaseous agents in series, the first being nitrogen trichloride, hypochlorous acid, chlorine dioxide or chlorine. Other effective combinations are chlorine dioxide or chlorine followed by nitrogen trioxide, and hypochlorous acid with nitrogen trichloride. Except in the last case, there is a marked diminution in the final bleaching effect when the order of application of the reagents is reversed.

Simultaneous application of the same reagents does not give as good an effect as when they are used separately, following the multiple technic previously reported for single gases.

Combinations of nitrogen trichloride caused greater changes in baking properties than was true of other combinations so far tried. The selection of reagent should be made on the basis of the baking properties, the reagents being balanced to give the desired bleaching efficiency.

Digest from "Multiple Bleaching of Flour. II Bleaching Efficiency in Systems Involving Nitrogen Peroxide and Another Bleaching Gas," by W. S. Hutchinson, C. G. Ferrari and R. I. Derby, and "III Bleaching Efficiency in Systems Involving Nitrogen Trichloride and Another Bleaching Gas," by Ferrari, Hutchison and Derby, *Cereal Chemistry*, vol. 22, 187-97 and 197-204, May, 1945.

## CANNING

### Canning Crabmeat

CRAB CANNING, as practiced on a Russian cannery ship, has recently been described.

Only the leg meat of male crabs over 6 in. in carapace is used. The back portion is carefully separated from the legs and discarded. Legs are cooked 14 to 16 minutes in galvanized iron baskets dipped in large tanks of boiling sea water, then cooled and chilled by suspending the baskets in the sea. Cooking tanks must be of such capacity that water is boiling again in 4 minutes after the basket is put in, as otherwise the cooking time will be too long and the meat very difficult to remove.

Crabs are best kept alive until needed for processing. Boiled legs

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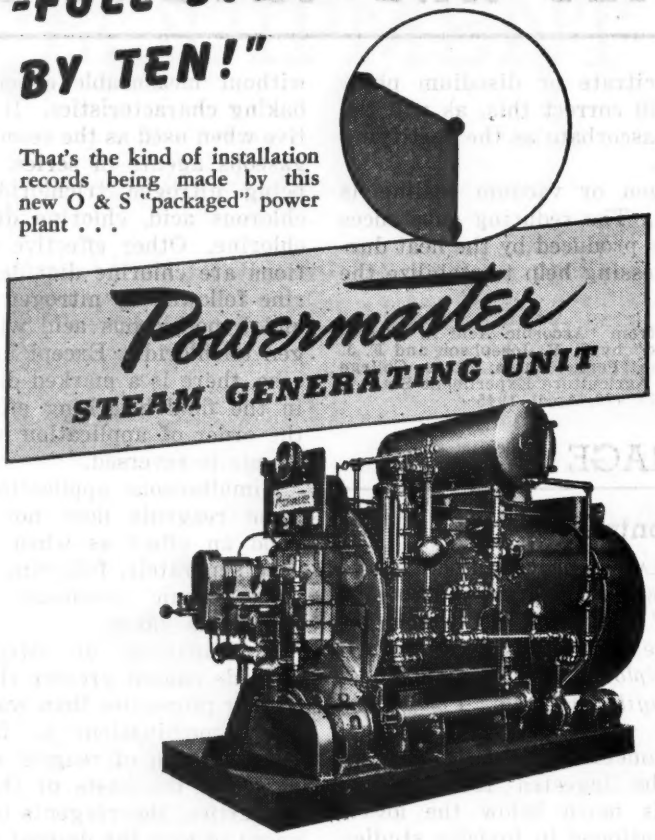


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can, if necessary, be held for a time before removing the meat, but that is not desirable. Crabs that have been frozen cannot be successfully canned, and processed crabmeat is ruined by freezing.

All cooking, cooling and washing of the meat is done in sea water, neither salt nor buffering solution being added to the pack. Baths of still water are used for washing, to prevent breakage of the meat.

Stainless steel is best where crabmeat must come in contact with metal. Parchment cups are used in enamel lined cans.

The crabmeat is packed by hand in ½-lb. cans, which are then vacuum sealed. The cans test 14 to 16 in. of vacuum. Retorting is at 230 deg. F., the retort requiring 7 minutes to come up to temperature and 7 minutes after processing to reduce the pressure. Holding time is 70 minutes. Cooling must be rapid to prevent crystal formation and discoloration of the meat.

[The American practice, as reported in the literature, for cannery ships operating off Alaska, is to cook 10 to 20 minutes in boiling fresh water, use jets of fresh water for washing, add salt and a buffering solution (when needed) in the can, and retort at 212 to 228 deg. F. (221.5 deg. for 80 minutes is considered optimum for quality.)]

Digest from "An Interview with Personnel of a Russian Floating Crab Cannery," by C. B. Carlson, *Fishery Market News*, vol. 7, 13-17, July, 1945.

# DEHYDRATION

## Dehydrated Soups

OBSERVATIONS incident to work aimed at the preparation of dried soups for emergency feeding offer valuable pointers for any dehydration development.

Formulas used, showing pounds of prepared, cleaned ingredients to produce 1-ton of puree, are:

| Ingredient | Vegetable soup | Meat and vegetable soup |
|---|---|---|
| Lean beef | .... | 320 |
| Fat | 25½ | 55 |
| Potato | 920 | 650 |
| Carrot | 460 | 350 |
| Cabbage | 230 | 192 |
| Oatmeal | 44 | 43 |
| Yeast extract | 17½ | 13 |
| Salt | 17½ | 17 |
| Pepper | ¾ | ½ |

These soups should be prepared from fresh materials. Vegetables must be sliced cleanly. Fine chopping causes loss of ascorbic acid, and in the case of potatoes it produces a product that will not reconstitute well. Vegetables must be added to the cooking pan as soon as possible after slicing.

In cooking, the mixture must be

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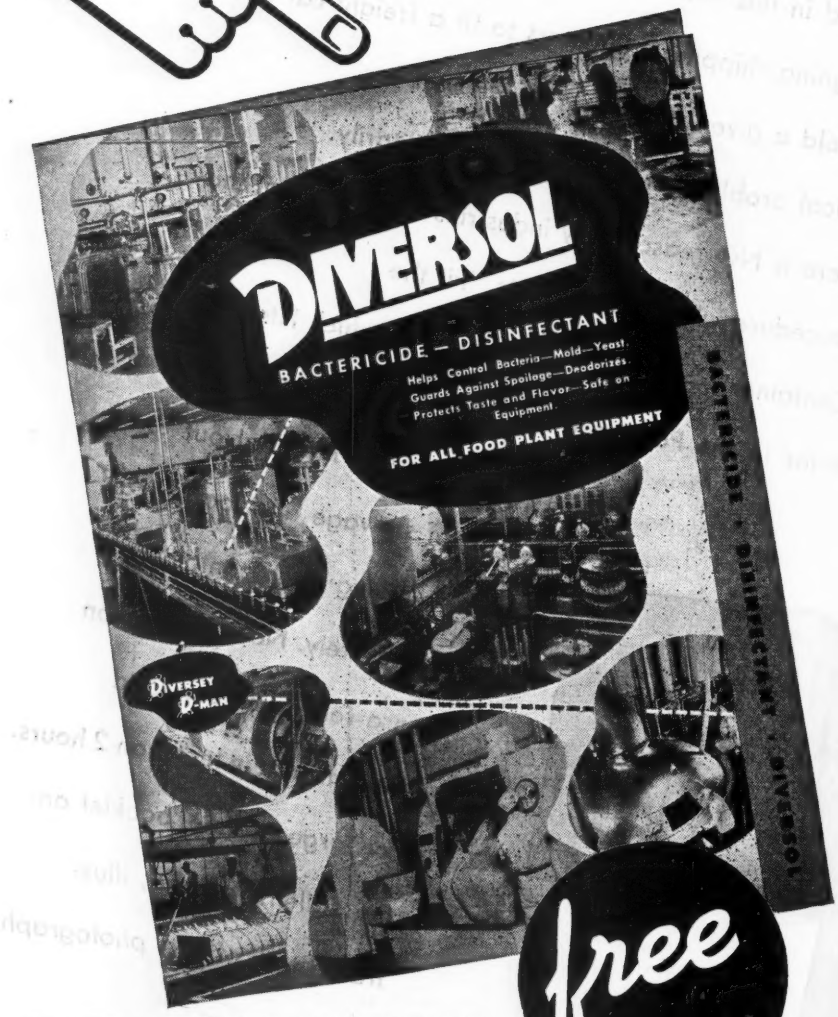


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kept boiling during the addition of the vegetables, as slow heating results in a large loss of ascorbic acid.

Yeast extract should contain at least 400 I.U. of vitamin $B_1$ per ounce.

Meat, if used, is finely chopped, then roasted in ovens. Raw or boiled meat added to the soup mixture gives no perceptible meat flavor.

The boiled batch is milled to make a smooth puree, then held above 158 deg. F. to prevent bacterial spoilage before drying. Roller dryers designed for milk can be used, but the speed must be reduced, for instance, from 15 r.p.m. down to 2 to 4½ r.p.m.

The soup is dried to 6 to 8 percent moisture on the drums, then reduced to 4 percent in a cabinet dryer.

The safest and cleanest way to introduce flavorings into the bland vegetable powder is by the addition of essential oils in water emulsion. Sufficient flavoring can be sprayed into the powder in a mixing machine, the rise in water content being only 0.1 to 0.2 percent.

Gas packing is requisite for storage.

All that is needed for reconstitution is to add the powder slowly to the necessary amount of hot or boiling water, stirring constantly during the addition.

Digest from "Dried Soup Powders. I. Precooked," by J. C. Fidler, R. Gane, R. Davies, L. W. Mapson, J. L. Pinder and E. A. Bishop, *Food Manufacture,* vol. 20. 277-81, August, 1945.

## BACTERIOLOGY

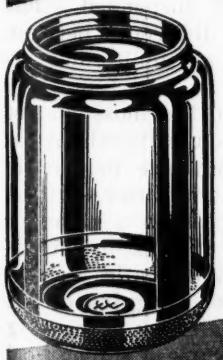
### Molds Kept Frozen

PRESERVATION of active specimens of molds, yeasts and bacteria by dehydration at very low temperature and extreme vacuum has been under test for almost four years at the Northern Regional Research Laboratory.

A preliminary report now states that all of the molds so stored were unaltered and most were able to grow normal colonies. A few molds did not develop numerous colonies after the long period of storage and these may need to be reprocessed every two years or so, while a small number of families having large spores are not adapted to this method of preservation.

Bacteria have been preserved frozen under vacuum for many years, but adaptation to molds is new and this technic has been improved so that as many as 60 mold preparations can be processed at

*Gentlemen! Just what does it take to convince you that more packers are turning to Foster-Forbes Glass Fruit and Vegetable Jars?*



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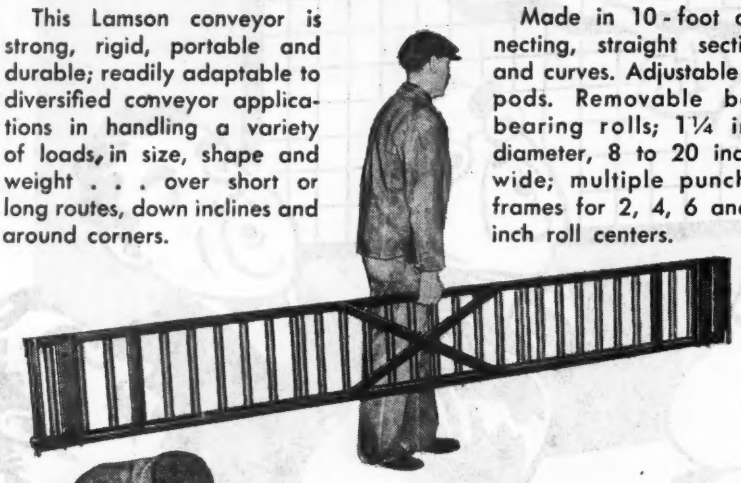

Designed for fast, one-man set-up. Safely carries cleated boxes, fragile cartons, and those containing glass-packed products. Full length rolls facilitate the handling of top-heavy packages and restrain cartons from running off the sides. Live loads up to 46 pounds per foot are carried with a minimum of section deflection.

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once, the work taking only a few hours.

A minute specimen of mold in its spore-bearing stage is placed in a small tube which is attached to a manifold. The tube is lowered into a quick freezing bath, then evacuated and sealed while under the vacuum. An electro-mechanical tester, not described in the preliminary report, is used to detect any air leakage into the tube. Storage temperature is near zero.

To reactivate, the tube is broken, the desiccated pellet is dropped into water or nutrient broth and the material streaked on the usual culture plates.

The process not only saves space in storage and guarantees against accidental contamination or change in the specimens, but eliminates the time previously required for scientists and highly skilled technicians in the routine culturing of the molds.

Digest from "New Method Developed for Storing Valuable Mold Collections," U. S. Department of Agriculture Advance Release 1203-45, July 4, 1945.

## ENGINEERING

### Good Engineering

FROM an engineering standpoint Irish moss presents two major problems—production of a filterable extract and water removal.

Canadian workers, using small pilot-scale equipment, have found that filterability is achieved by extraction without agitation. For solutions of equal viscosity, it is the presence of suspended solids that makes the difference between a filterable and an unfilterable extract.

Thick beds of the moss do not permit extraction without agitation because they are practically impenetrable to the water. But by spreading the moss on a series of 40-mesh screen shelves in an enclosed extractor, a gentle recirculation is possible. Clogging of the screens is prevented by supporting the moss on an 8-mesh screen held ⅛ in. above each tray bottom. Solution strength is built up by using as extractant at 212 deg. F. an extract obtained from a previous batch at 190 deg. F.

Carbon deodorization is necessary to produce an edible gelling agent. The complicating factor here again is the suspensive power of the liquid. By using fairly coarse decolorizing charcoal and filter aid, and by avoiding drastic agitation,

# Sage

This type of seasoning, so well known to all Americans in Sage Dressing and as a flavoring for sausage, is a perennial shrub about two feet high that grows largely in Southern Europe, principally on the Dalmatian Coast (Austria) and in Italy. A small amount is grown in Spain and Greece, generally on sunny mountain tops. The finest quality is the Austrian variety, which is due to the soil, climate and temperature of this part of the country lying along the Adriatic Sea. Only the leaves are picked and used for seasoning and medicinal purposes. When crude Sage is used in seasoning, the spice generally varies in flavor or strength, so our grandmothers had to use caution as well as call on their years of experience to get just the right amount of flavoring out of the ground leaves. However . . . . . .

***Cream of Spice Sage***

has a standard and uniform strength, in fact, 1 ounce of Cream of Spice Sage replaces approximately 3 ounces of Crude Sage. The Stange patented process of natural spice extraction retains ALL the natural delicate flavor of true SAGE. This science of seasoning produces higher standards of spice flavor, new techniques of blending; and by standardizing the strength, purity and quality of flavor obtained from NATURAL spices and by utilizing ALL of the available flavoring substances, Stange has put FLAVOR CONTROL IN LARGE SCALE PRODUCTION UNDER LABORATORY CONTROL. Cream of Spice (C.O.S.) is nature's best, put in a form most suitable for use in your products.

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SEASONINGS

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the charcoal can be filtered out in a precoated filter press. The precoating must be complete, as any carbon that gets through the first filtration cannot be removed by subsequent filtration. Charcoal is mixed throughout the liquid by gentle agitation in a tank fitted to admit air at the bottom. The suspension flows to the pressure chest of the filter by gravity. Filtration requires 50 to 60 lb. of pressure.

The content of solids of the filtered extract is about 1.8. To this is added 1 part potassium chloride to each 3 parts of solids, to give a liquid holding not less than 2 percent total solids. The water is then removed down to 80 percent by freezing.

### How Ice Is Removed

The freezing technic must result in a condition from which the ice can be removed mechanically, because cold-water-soluble portions of the gelose represent the suspensive constituent. Trays 33x20 in., with a depth of ⅜ in., are filled in a room maintained free from dust. The freezer is held at 10 deg. F. When the temperature of the jelly is just below 32 deg. F., crushed ice is scattered on the surface to prevent supercooling. When freezing is complete, there is a layer of KCl and gelose between two layers of almost pure ice. The gelose layer is sufficiently rubbery so that the ice can be cracked off mechanically. The gelose sheet is then dried at room temperature under a fan to an 8 to 10 percent moisture content, drying taking about two hours.

Sun bleached moss is used. It is washed by spraying with water at 45 deg. F. or below for 10 min. to remove sand, sea water salts and the brownish-yellow oxidized surface of the moss.

The product dissolves in water at 160 deg. F. without lumping. The 2 percent gel melts between 130 and 140 deg. F., sets between 100 and 110 deg. F. Gel strength is slowly reduced at high temperatures and the viscosity rapidly reduced. However, it will stand autoclaving at 230 deg. F. for 200 min. in 6-lb. tins of jellied canned pork, for which the texture is also desirable. It is excellent for use as a suspensive agent in chocolate milk. It is not found desirable for desserts or fruit jellies.

Digest from "Preparation of Irish Moss Extracts for Use as a Jelling and Stabilizing Agent in Foods," by C. O. Fulton and B. Metcalfe, *Canadian Journal of Research*, vol. 23 F, 273-85, July, 1945.


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# FORMULAS FOR FOODS

FORMULA NO. 555

## Soft Wine Drop Cookies

| | |
|---|---|
| Whole eggs | 3 lb. |
| Molasses, high grade | 12 lb. |
| Enzyme-converted corn sirup | 4 lb. 8 oz. |
| Shortening | 5 lb. 4 oz. |
| Brown sugar | 10 lb. 4 oz. |
| High-fat soya flour | 2 lb. 4 oz. |
| Cinnamon | 6 oz. |
| Cloves | 2 oz. |
| Nutmeg | 2 oz. |
| Salt | 7 oz. |
| Soda | 10½ oz. |
| Water | 14 lb. 8 oz. |
| Raisins | 3 lb. 8 oz. |
| Cake flour | 25 lb. |
| Baking powder | 2½ oz. |

### Directions

Cream together until light, using low or medium speed, the eggs, sugars and sirups, shortening, soya flour, spices, salt and soda. Soak the raisins in the water, then stir in. Sift together the cake flour and baking powder. Add to the mixture and mix smooth.

Temperature of the finished batter should be 70 to 75 deg. F.

These cookies should be deposited with a wire-cut or drop machine on lightly flour-greased pans. Dip in sifted powdered sugar, if available. Bake at once at 400 deg. F.

It is suggested that the salt, soda and water may need to be varied to suit manufacturing conditions. Pastry flour can be substituted for part of the cake flour.

Formula from A. E. Staley Mfg. Co.

FORMULA NO. 556

## Cocoa Pound Cake

| | |
|---|---|
| Cake flour | 23 lb. 14 oz. |
| Fine granulated sugar | 27 lb. 14 oz. |
| Salt | 12 oz. |
| Baking powder | 5 oz. |
| Emulsifying shortening | 12 lb. |
| Liquid skim milk | 11 lb. |
| Vanilla | 7 oz. |
| Cocoa base | 11 lb. |
| Whole eggs | 12 lb. 12 oz. |

### Directions

Blend on low speed for 1 minute the cake flour, sugar, salt, baking powder and shortening, then mix in the skim milk and vanilla. Mix for 5 minutes on medium speed, scraping once. Add the cocoa base, mixing 1 minute on medium speed and scraping the paddle again. Add the eggs in two portions, scraping well after each addition, using a total of 5 minutes for the entire mixing period.

Bake at 340 deg. F.

### Cocoa Base

| | |
|---|---|
| Water | 42 lb. 12 oz. |
| Emulsifying shortening | 7 lb. |
| Cocoa | 25 lb. |
| Sugar | 21 lb. 4 oz. |
| Soda | 8 oz. |
| Glycerine | 3 lb. 8 oz. |

Bring the water and shortening to a rolling boil, then add the dry ingredients, sifted together. Stir in the glycerine and mix well.

Cool the base before adding it to the cake mix.

The glycerine can be omitted if the base is to be used immediately.

Formula from Brown's Hungarian Corp.

FORMULA NO. 557

## Bloater Paste

| | |
|---|---|
| Herring, cleaned | 10 lb. |
| Tomato puree | 5 oz. |
| Spiced vinegar | 2 oz. |
| Port fat | 1 lb. |
| Cornstarch | 2 oz. |

### Directions

Scale the herring, remove heads and entrails, then wash. Remove any roe or milt. Soak 10 minutes in saturated salt brine, then drain, spread on trays and smoke for 30 minutes at 140 deg. F. Remove backbone by grasping where head was cut off and pulling. If the backbone does not come out, smoke further.

Macerate, preferably in a silent cutter, and mix with the other ingredients. Pack in 2-oz. cans, filling the can completely. Process 30 minutes at 240 deg. F.

Formula from Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 63.

FORMULA NO. 558

## Honey Topping

| | |
|---|---|
| Butter | 1 lb. |
| Emulsifying shortening | 1 lb. |
| Granulated sugar | 2 lb. |
| Honey | 12 oz. |
| Cashew nuts | 8 oz. |
| Pecans | 2 lb. |
| Milk | 12 oz. |

### Directions

Heat the sugar, honey, shortening and butter on a slow fire until the sugar is dissolved. Grind the pecans, grind and toast the cashew nuts, and add these, with the milk. Stir and bring to a boil. Use warm on sweet dough products such as coffee cake.

Formula from Swift and Co.

FORMULA NO. 559

## Banana Layer Cake

| | |
|---|---|
| Cake flour, best grade | 4 lb. 8 oz. |
| Butter or substitute | 12 oz. |
| Shortening | 1 lb. |
| Sugar | 7 lb. |
| Salt | 2½ oz. |
| Powdered skim milk | 6 oz. |
| Baking powder | 4½ oz. |
| Bananas, fully ripe | 4 lb. |
| Water | 2 lb. 8 oz. |
| Whole eggs | 3 lb. 8 oz. |

### Directions

Cream together 2 lb. 8 oz. of the cake flour, the butter and shortening, using the paddle beater for 3 minutes at second speed. Sift the sugar with the rest of the cake flour, salt, skim milk powder and baking powder, and add, followed by the bananas and 1 lb. 8 oz. of water. Cream 3 minutes on second speed. Add the eggs slowly, and cream 3 minutes more. Finally add the remaining 1 lb. of water, and cream 5 minutes at second speed.

Use well-greased layer pans, scaling 12 oz. for an 8-in. round pan and 13½ oz. for a 9-in. pan. Bake at 360 to 365 deg. F.

Formula from Fruit Dispatch Co.

FORMULA NO. 560

## French Doughnuts

| | |
|---|---|
| Water | 2 lb. |
| Skim milk powder | 2 oz. |
| Emulsifying shortening | 12 oz. |
| Salt | ⅛ oz. |
| Spring wheat flour | 1½ lb. |
| Milk, liquid | 4¼ oz. |
| Whole eggs | 1½ to 2 lb. |
| Vanilla | to taste |

### Directions

Bring to a good boil the water mixed with the skim milk powder, shortening and salt. When boiling, add the flour, stirring rapidly until the mixture leaves the sides of the kettle. Remove from the fire and add the milk, which must be cold. Then cool and add the eggs slowly, a little at a time. Finally, add the flavoring. Fry at 360 deg. F.

These may have a thin water icing, applied when warm.

Formula from Armour Research Bakery.

FAST . . . DEPENDABLE . . . SAFE

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**Materials Methods Service**

***is your best answer for doing equipment clean-up work EASIER . . . safeguarding product QUALITY!***

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But remember, there is a WRONG and a RIGHT way to clean aluminum, Monel metal, copper, stainless steel, tinned, galvanized or glass-lined equipment. That is why we say . . .

Benefit by the successful experience of others . . . use SAFE, specially designed Oakite materials that clean THOROUGHLY, quickly, economically, yet PROTECT surfaces of valuable equipment and extend its useful life.

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Whether or not you are now using Oakite materials, all our facilities and experience are freely available to you through our Technical Service Representatives . . . to help you find the RIGHT ANSWER to your sanitation problems.

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•

Ridding Floors of Syrups, Juices, Sugar, Oil, Grease, Etc.

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De-Scaling Water-Cooled and Water-Circulating Equipment

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•

Cleaning Rubber, Stainless Steel and Wire-Mesh Conveyor Belts

OAKITE MATERIALS METHODS SERVICE — Buy Bonds for Victory — CLEANING FOR EVERY CLEANING REQUIREMENT

## Salaries for Food Technologists

(*Continued from page 72*)

with which he views a connection with this company."

The questions are more searching, for while this concern desires the applicant to view the company seriously, it is at once apparent that it views itself even more seriously. However, refreshingly enough, it makes no difference to this outfit whether you are right or left handed. They do not even mention it. But they do want to know such things as: "What value do you place on your property, both real estate and personal?" They also ask: "Have you any other income besides what you will receive from us?" Then there is this rather strange question for a technical man to have to answer: "Have you ever collected along with your selling?" "What territory have you covered, what have you sold, and what were your average sales for the past three years?" Remember, too, that "Every question must be answered."

But the company does give one break that none of the others do. On the fourth and last page of the questionnaire there are 16 lines upon which the chemist may "state fully why you believe you are qualified for this kind of work and why you desire to connect with the ---------- Company." It would be interesting to know what faint wisps of doubt could have entered the mind of the executive who prepared the questionnaire to make him wonder whether the preceding three pages of searching interrogation had really asked the pertinent questions.

Now, in the name of Paracelsus and Pasteur, what the hell goes on here? How can the chemist, the food technologist, expect the boss to appraise his work intelligently and fairly when the said boss can't even ask the right questions of his food technologist? And if the boss can't appraise the value of the chemist's work, what makes you think he's going to pay much for it? No, sir, the food industries are a good place to stay out of until such time as conditions change. That low-ceiling feeling won't go away while these questionnaires are around.

### A Job for IFT?

Now isn't this a job for the Institute of Food Technologists? Why not a project to draw up a sane

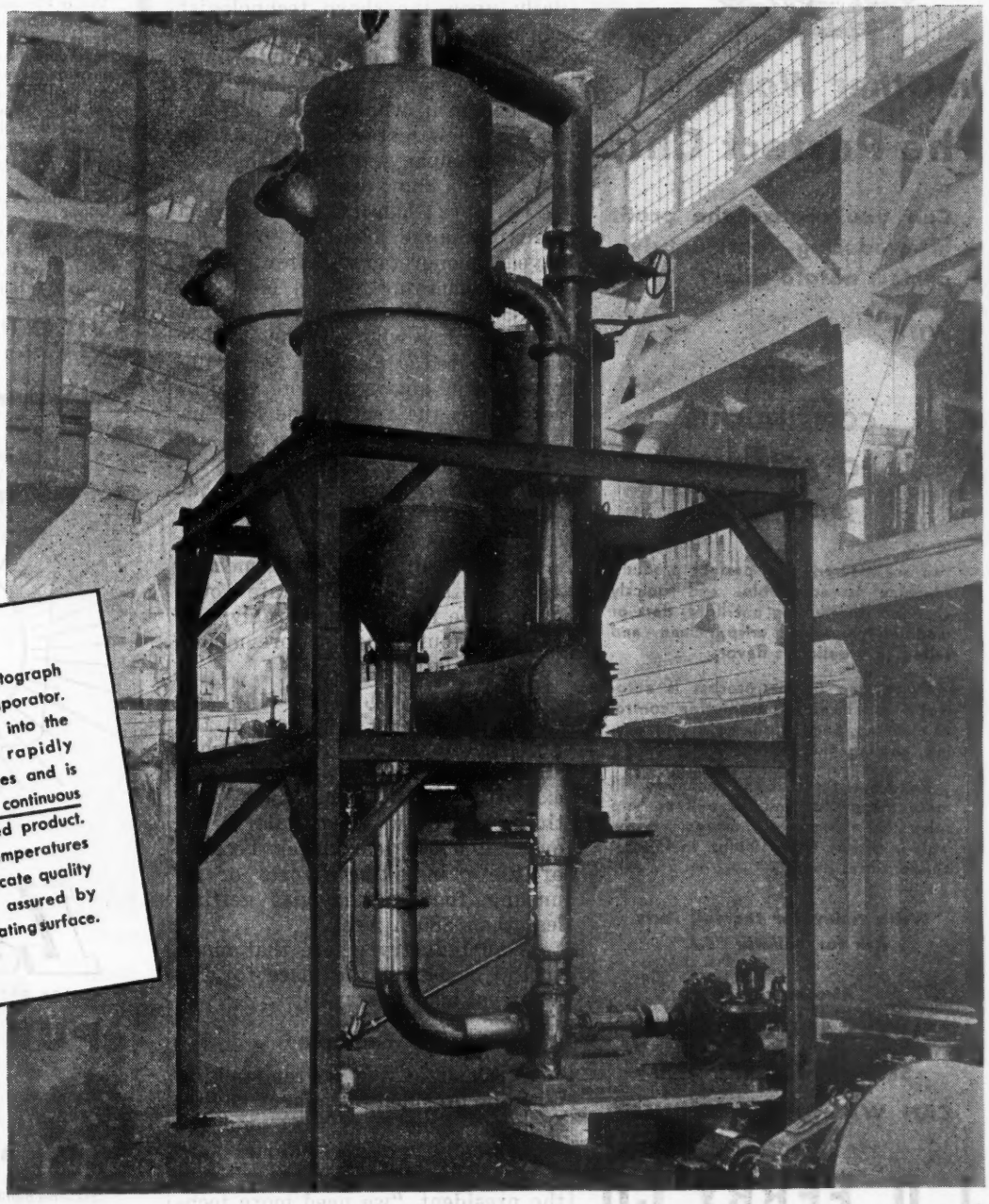
# a NEW way to profitably meet food producing requirements

**TO FOOD PROCESSORS** Buflovak now offers Vacuum Food Product Evaporators of stainless steel, designed to profitably meet the exacting requirements for producing concentrated food products (fruits, juices, vegetables), of high quality, natural flavor, good color, smooth, uniform texture, and good body.

Here's why new standards of quality are assured with Buflovak: (1) Rapid evaporation (2) Continuous production (3) Immaculate cleanliness.

Buflovak Evaporators are built in sizes and types to meet every operating condition, including multiple effect, that saves 50% in steam and cooling water! Evaporators are only one of Buflovak's line for food processors. Others include Atmospheric and Vacuum Dryers, Heaters and Coolers, By-Recovery and Distillation Equipment, Coils, Kettles and Stills. For full details refer to Food Industries 1945 Catalogs and Directory, or write us direct.

## *Buflovak* VACUUM FOOD PRODUCTS EVAPORATOR



Here is an installation photograph of Buflovak's Vacuum Evaporator. The liquid is introduced into the Evaporator, passes rapidly through the heating tubes and is quickly discharged, in continuous operation, as a finished product. Correct operating temperatures that preserve the delicate quality of the products are assured by carefully designed heating surface.

**BUFLOVAK EQUIPMENT DIVISION OF BLAW-KNOX CO.**
1543 FILLMORE AVE.
**BUFFALO 11, N. Y.**

***In Other Words . . .***

**The Perfect Chip!**

**Can you realize the profit in producing—continuously—perfect potato chips?**

***WITH***

**FERRY CONTINUOUS POTATO-CHIP MACHINES**

you are assured of a perfect product. Machine is adjustable, and quickly changed, for turning out light, dark or medium chips—all crisp, clean and salted to a delicious flavor.

Every step in the process is automatic and there is push-button control of cleaning, peeling, slicing, frying, drying, cooling and salting.

Read how these FERRY machines will make money for you, as well as help solve the man-power shortage. Available in 5 sizes, from 100-lbs. to 450-lbs. capacity per hour.

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questionnaire for technical help in the food industries? Certainly, the Institute carries enough weight to bring pressure to bear upon the companies and their personnel departments to adopt such a sane questionnaire. Both of the companies cited are large, important companies in their respective industries and they owe it to themselves, as well as to the profession, to adopt a new and dignified questionnaire, one which drops completely those questions that are either annoyingly asinine or complete invasions of the technologist's private affairs.

Another little straw in the wind that blows the Nelsonian dictum daily upon the shorn technologist can be found on page 68 of the December, 1944, issue of FOOD INDUSTries. Thereone, the president of a nonfood firm, who had recently acquired a new research director from a food company, is quoted as saying: "You know very well that it takes more than money to get a man to change jobs. Up to $5,000 a year, money talks. After that, it takes something else." Now the contention of this writer is that any industry where $5,000 a year is considered a big salary, as is implied in the above anecdote (and as actually is the fact in the food industries) is a good one for the ambitious technologist to stay out of. You certainly could not make that $5,000-a-year crack about sales managers of first-rate firms. Nor about top-flight advertising men, to name another field. The ante would have to be raised considerably, say three or four times, before money stopped talking.

In similar vein, one of the best informed men in America on the problems of the food industries has stated: "I have known some sales executives, alas, who have continued to draw down salaries of over $30,000 a year largely because of the painstaking efforts of an unsung food technologist getting less than $80 a week."

Is an industry where that much spread can exist the place for the technical man to stay?

### For Example

A friend of the writer, talking with the president of a large baking company some few years ago, got on the subject of the salaries paid in that industry. "You know," said the president, "we need more technical men in our field, but ours is a low-paying industry, particularly for those on the production side of the house."


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**NATURAL "B" COMPLEX YEAST VITAMIN PRODUCTS AND YEAST DERIVATIVES**

**Plasmolyzed Yeast Extracts for FOOD and AMINO ACID PREPARATIONS**

Vi-Co Plasmolyzed Yeast Extracts are prepared by enzyme digestion of brewers' yeast to yield a B complex product rich in essential amino acids. Amino acids provide the necessary "building blocks" for healthier and stronger bodies.

These products possess a definite "meat-like" flavor useful in enriching soups, bouillon cubes, tomato juice and other packaged foods. Such enriched foods are also of value for their natural B complex and high amino acid composition.

Consult us about your vitamin or yeast problems. Our technical staff can best advise you how Vi-Co products can be used to enrich your own products.

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QUICK FROZEN VITAMIN RICH

**PURE JUICES**

ORANGE
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Exclusive distribution franchises are available in some areas. Write for complete information and new store-display material.

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**PICO, CALIFORNIA**

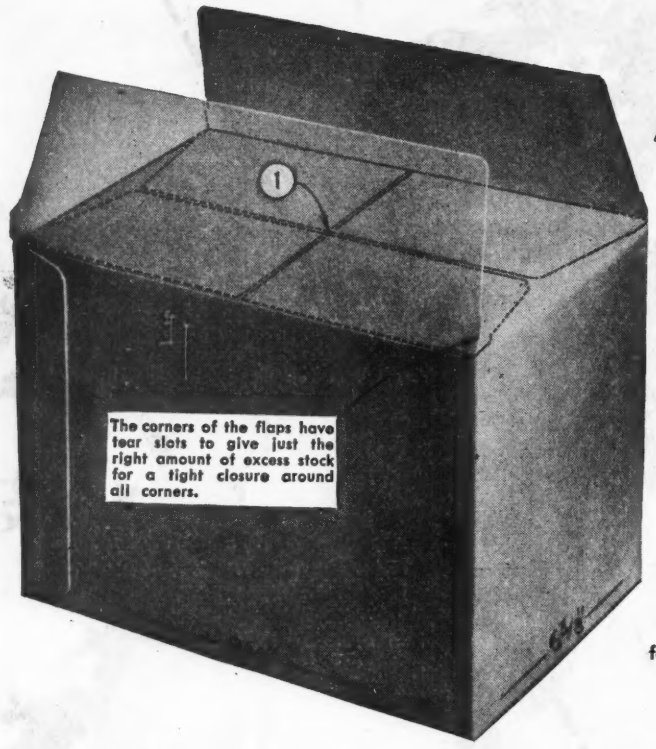
# HOSPITALITY KING SIZE

When the gang is coming in for an early fall barbecue supper . . . it's time to match robust appetites with food that makes a hit all around. Savory barbecue sandwiches . . . steaming coffee . . . and all the fixings, like Haase's Barbecue Sauce. Haase's Spanish Olives are another favorite of experienced hostesses . . . man, they're colossal . . . king size hospitality.

These popular products are packed by the A. C. L. Haase Co., of St. Louis, Mo. You can tell at first taste that here is a company that really believes in superior quality. Come to think of it, maybe that's why they selected Crown Lug Caps and Crown Screw Caps as the best seals for their products. The quality of Crown Closures is outstanding, too. Crown Cork & Seal Company, Baltimore 3, Md.

*World's largest makers of metal closures.*

**CROWN CLOSURES**


1
The corners of the flaps have tear slots to give just the right amount of excess stock for a tight closure around all corners.

**These Boxes Are Made From Waste Paper**

***Save It***

**THE ARMY RATION 10-IN-1 INNER CARTON**

for the rations that need moisture protection.

# *Tightest in Food Cartons*

The Army's Ration Ten-in-One Inner Carton, designed to keep the soldiers' rations dry and edible, through the many hazards of transport and field storage, is a stiff test of box making. The Q.M.C. specifications are as follows:

***The board shall be well-sized throughout.*** Test — When held under water as specified for 10 minutes, a 6" square section shall not absorb more than 4.0 grams of water.

***The board shall permit penetration of the microcrystalline wax*** (specified for dipping the sealed cartons) *to a depth of not less than 35% of its thickness in 5 to 10 seconds of contact.*

***No overlap of inner and outer flaps is permissible, nor shall they gap more than 1/16" (1). No scores shall check or crack.*** This requires keeping moisture content of board between 6 and 8%; enough to prevent cracking at folds, but not enough to cause shrinkage and inaccurate die-cutting.

***Final Test*** — A sample of ten cartons is taken from each day's production, sealed and dipped twice in the molten wax (0.005" film), and then immersed in water for 24 hours. At least 90% of them must be dry inside when taken out and opened the next day.

We have made millions of ration cartons meeting these specifications for Uncle Sam. Your peacetime packaging needs may not call for any boxes so precisely made. We can, however, design and manufacture whatever you will need in

***Solid Fibre and Corrugated Shipping Containers and Folding Cartons***

**Hummel & Downing Co.**

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My friend commented that the president had started in business less than 20 years before by selling pies from a pushcart and yet had risen rapidly enough that his sons were enrolled in a very good and expensive eastern college. And the president himself had but recently returned from an extensive South American cruise. So, therefore, it was not a question of either the company, or the industry generally, failing to make money. It was simply that money, in any sizable chunks, rarely got down as far as the technical men.

**Quoth Shakespeare:**

Then what is the technologist to do? He might ponder the wisdom in Shakespeare's line: "The fault, dear Brutus, is not in our stars, but in ourselves, that we are underlings." He might also consider whether those sterling virtues of patience and perseverance, probably learned at his mother's knee, are still virtues in the modern world. He might also look about him at the men who have gone forward in any field, whether in technological pursuits or otherwise, and reflect upon the one quality at least which all such successful men have had in common.

This much we do know about the men who have climbed ahead. If they have not gotten prompt and liberal recognition—and in the business world, recognition means cash, not a gold-filled watch as reward for 50 years of faithful service—if they haven't gotten recognition, they've had the guts and the sense to get out of that field and into another one where their abilities had a chance to hit the jackpot. There is absolutely no point, these men learned early in life, in waiting around for patience to triumph in the last chapter.

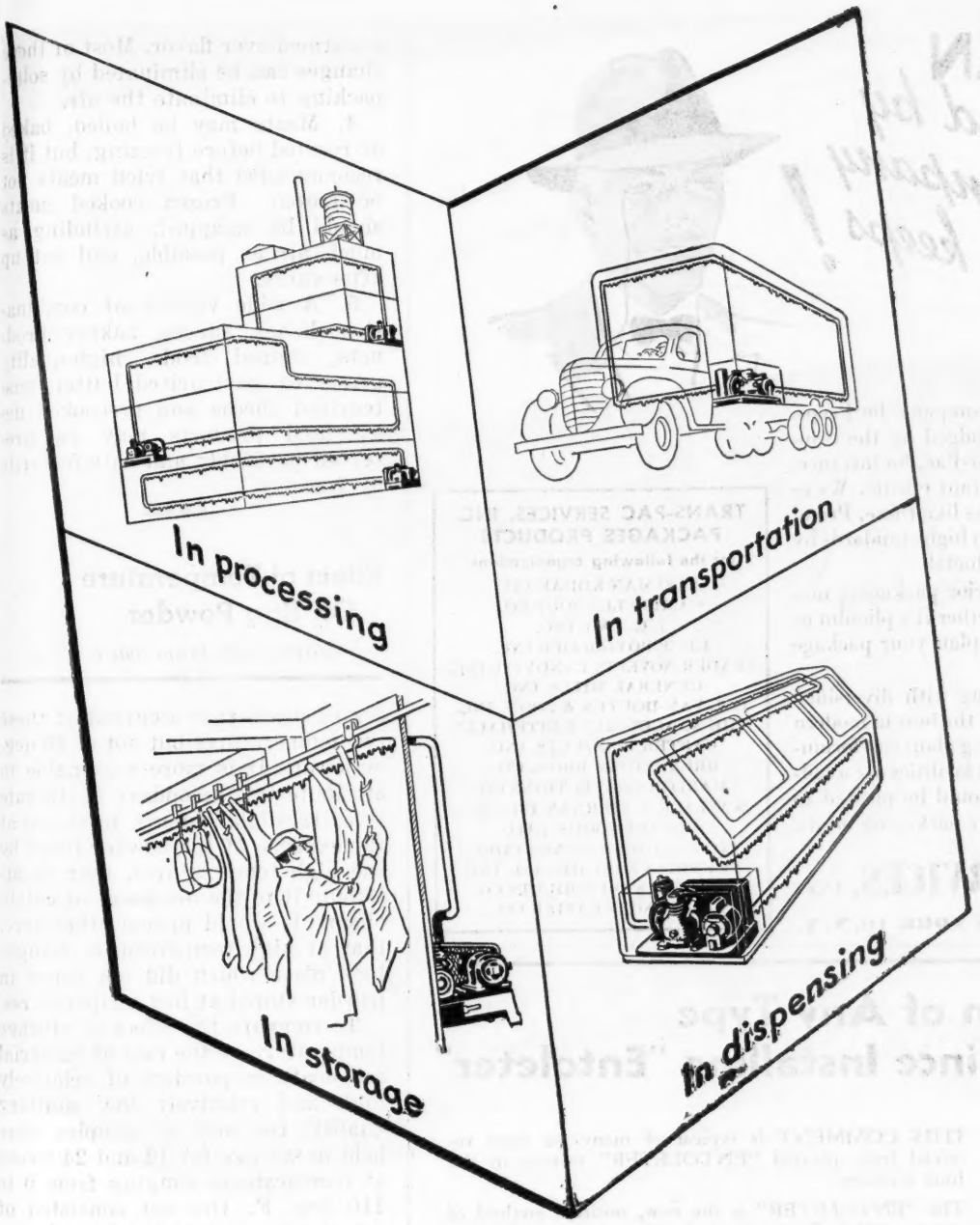
## Freezing Cooked Foods

(*Continued from page* 106)

tile flavors of cooked foods during preparation, packing, freezing, storing, thawing and serving than is the case with raw foods.

2. The flavor of blueberries, raspberries, blackberries, apples, plums and grape products is improved if the fruits are preheated and packaged as a solid-pack before freezing.

3. Precooked vegetables packaged as loose-pack are deficient in fresh flavor and aroma and develop




# It's G. E. for refrigeration in the Frozen Foods Industry

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You'll find the right size for every job . . . ratings range from 1/6 to 125 hp. And in *every* size, you'll find the features that make G-E equipment tops in refrigeration . . . long life, low operating cost, low maintenance costs—and the dependability that's essential to keep food at peak quality, *and value.*

That's why it will pay you to *turn to G. E.* when you plan purchases of refrigeration equipment for frozen foods processing or distribution. Get the facts today. *General Electric Company, Air Conditioning Department, Section 58910, Bloomfield, N. J.*

**BUY . . . and hold . . . WAR BONDS**

**GENERAL ELECTRIC**

# A MAN *is judged by the company he keeps!*

A MAN is judged by the company he keeps. And so a company is judged by the companies it services. Take Trans-Pac, for instance, and scan its roster of important clients. We're proud to service organizations like these. Proud to have them endorse our own high standards by letting us package their products!

Soon many new and superior packaging materials will be available. Whether it's pliofilm or glassine lamination, we can plan your package needs now.

Our long experience dealing with diversified products enables us to supply the best in modern packaging. Post-war packaging plans can formulate, however, only as soon as facilities are available. Until that time, we should be pleased to advise you on your particular packaging needs.

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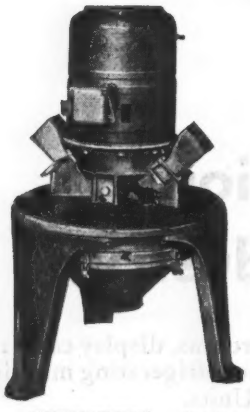
# No Infestation of Any Type Since Installing "Entoleter"



"ENTOLETER" shown above handles 15,000 lbs. per hr. Also in sizes to handle 2,000, 5,000, or 10,000 lbs. per hr.

THIS COMMENT is typical of many we have received from pleased "ENTOLETER" owners in the food industry.

The "ENTOLETER" is the new, positive method of insect control. Its mechanical action destroys all forms of insect infestation in flour, cereals, spices, granulated, powdered and similar free-flowing dry materials, before processing and in the finished product before packaging.

The "ENTOLETER" is a compact machine, approximately 3 ft. high and 2 ft. in diameter. It is easily installed and maintenance cost is negligible.

Let us show how "ENTOLETER" control can benefit your plant. Free copy of new 6-page bulletin, entitled, "Modern Control of Insect Infestation," sent on request. ENTOLETER DIVISION, The Safety Car Heating and Lighting Company, Inc., PO Box 904, New Haven 4, Conn.

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INFESTATION DESTROYER
REG. U. S. PAT. OFF.

**CONTINUOUS DESTRUCTION OF ALL INSECT LIFE**


a warmed-over flavor. Most of these changes can be eliminated by solid-packing to eliminate the air.

4. Meats may be boiled, baked or roasted before freezing, but it is recommended that fried meats not be frozen. Frozen cooked meats should be wrapped, excluding as much air as possible, and cut up afterwards.

5. A wide variety of combination dishes, sauces, bakery products, canned foods, high-quality preserves, pasteurized butter, pasteurized cheese and precooked dehydrated products may be preserved profitably and satisfactorily by freezing.

*—End—*

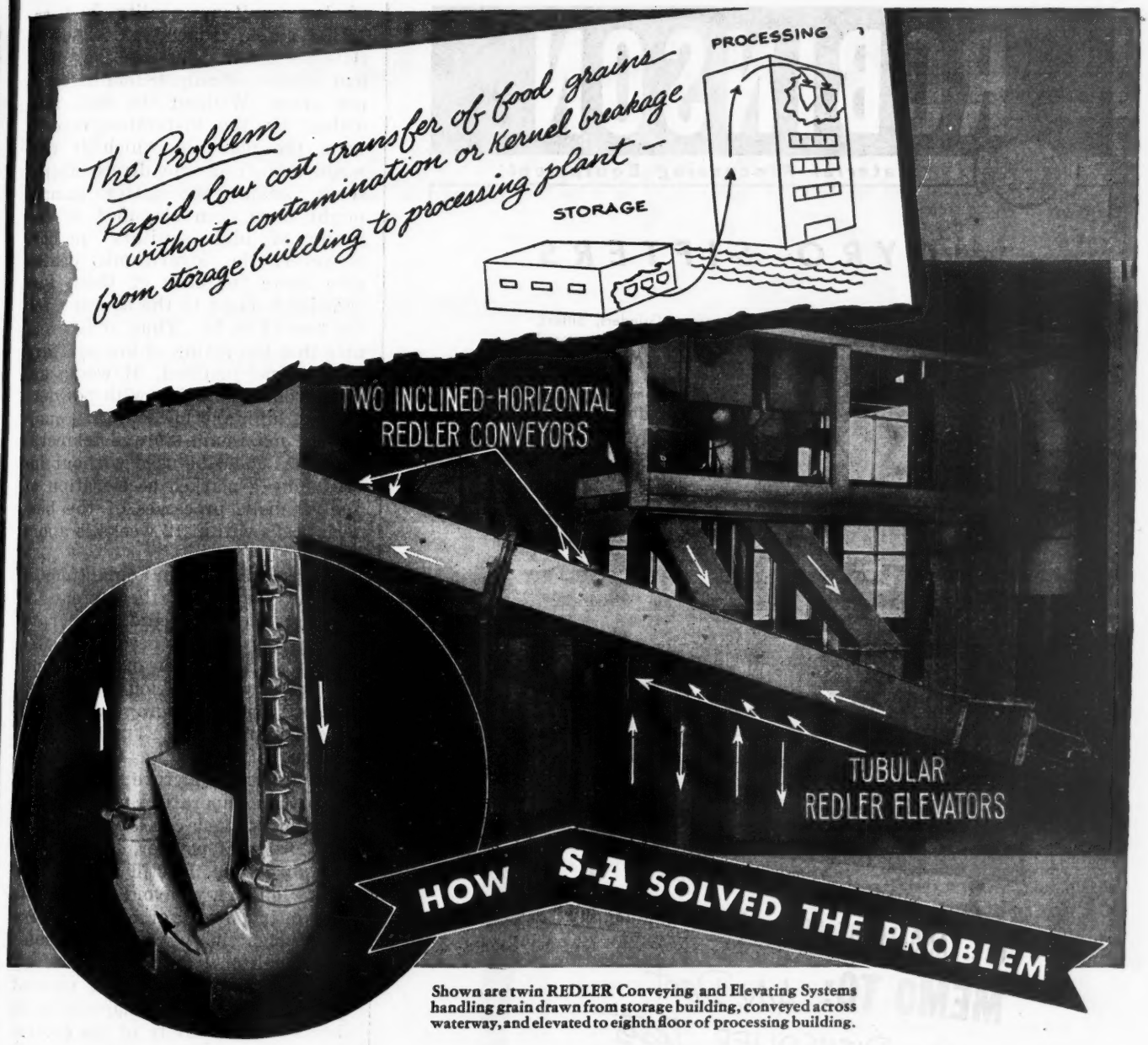
## Effect of Temperature On Egg Powder

(*Continued from page* 101)

erated death rate occurred at these two temperatures but not at 86 deg. or lower. It is more reasonable to attribute this secondary death rate to extracellular agents, produced at the expense of the powder itself by the high temperatures, than to attribute it to the processes of catabolism. It would appear, therefore, that at high temperatures changes took place which did not occur in powder stored at low temperatures.

To compare the effect of storage temperature on the rate of bacterial cell death in powders of relatively high and relatively low sanitary quality, two sets of samples were held in storage for 12 and 24 weeks at temperatures ranging from 0 to 110 deg. F. One set consisted of samples from eight batches of powder of high sanitary quality, as judged by plant-inspection reports and initial bacterial counts. They had direct bacterial counts of less than 5,000,000 dead and viable cells per gram and an average dilution plate (viable cell) count of 25,400 cells per gram. The moisture contents were within the range of $4.45 \pm 0.31$ percent. The set of low sanitary quality consisted of samples from two batches having an average direct microscopic count of 17,500,000 dead and viable bacteria per gram. The average moisture contents were 4.41 and 4.68 percent, respectively. The samples within each group were reasonably comparable on the basis of sanitary quality, and all samples were comparable on the basis of moisture content. The results of these studies are shown in Figs. 3 and 4.

One of the samples in the group


The Problem
Rapid low cost transfer of food grains without contamination or kernel breakage from storage building to processing plant —
PROCESSING
STORAGE
TWO INCLINED-HORIZONTAL REDLER CONVEYORS
TUBULAR REDLER ELEVATORS
HOW S-A SOLVED THE PROBLEM

Shown are twin REDLER Conveying and Elevating Systems handling grain drawn from storage building, conveyed across waterway, and elevated to eighth floor of processing building.

• To overcome the special problems involved at this food plant, S-A engineers selected S-A REDLER Conveyors and Elevators as the ideal handling equipment.

Inside the dust-tight sealed casings of twin REDLER systems (one for wheat and one for rice), grains are protected against the entrance of dust or other contaminating particles. And because of the gentle, mass-movement conveying action of the patented REDLER method, agitation and consequent breakage of fragile kernels are prevented.

Then, too, these compact REDLER Conveyors and Elevators handle great tonnages of grain rapidly and at rock-bottom costs. For similar benefits in your plant, ask for full data on REDLER Systems. Write today.

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*Designers and Manufacturers of All Types of*

**BULK MATERIAL HANDLING EQUIPMENT**

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UNIQUE

Material Processing Equipment

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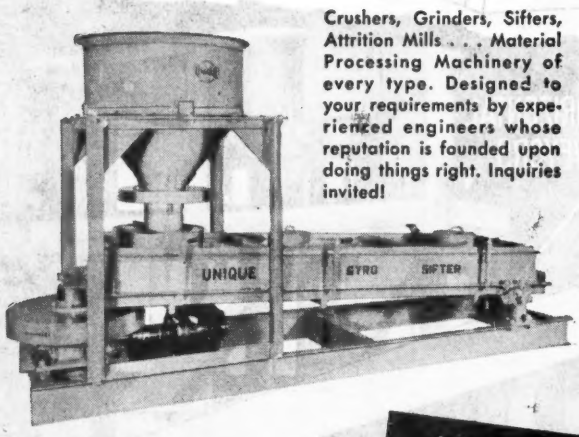


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INTER-OFFICE CORRESPONDENCE

THE TANGLEFOOT CO., Grand Rapids, Mich.

MEMO TO: Adv. Dept.

Re: DIFUSOLIER Tests

Whaddya' mean - "It can't be that good?" &%#!! That DIFUSOLIER is a honey - give it a work-out in the lab & see for yourself. But don't publicize YET EJD

dead roaches

of low sanitary quality had an initial viable cell count of 240,000 cells per gram, whereas the other had a count of only 48,000 bacteria per gram. Without the data furnished by the inspection reports from the plant in which it was made and from the direct microscopic count, the latter sample might have been classified in the group of high sanitary quality. However, the logarithmic death-rate curve for each of these two samples is close to the average for the two (Fig. 3). Thus, it is probable that the rating of low sanitary quality was justified. It would appear from Fig. 3 that with powders of both high and low sanitary quality the maximum storage temperature that could be used without introducing a marked acceleration of the catabolic processes of the bacterial cells within 12 weeks is about 50 deg. F.

As the temperature and time of storage increased, the extent of bacterial death in the powder of low sanitary quality became greater than that in powder of high sanitary quality. If the log $C_i$ —log $C_t$ values from the average counts of these samples after 24 weeks' storage are plotted (Fig. 4), a somewhat different picture is obtained as to the temperature necessary to prevent marked cell death in the two classes of powder. A temperature of 50 deg. F. still appeared to be low enough to avoid appreciable change in powder of high sanitary quality, but in powder of low sanitary quality a temperature of 32 deg. F. was necessary to prevent changes of a similar magnitude. In terms of the activity of the catabolic processes, this would appear to mean that in the long-time storage of egg powders of low sanitary quality a temperature lower than 50 deg. F. is necessary to suppress the activity of an extracellular factor which accelerates the chemical reactions involved.

Data obtained with three samples of spray-dried whole-egg powder after 48 weeks' storage at different temperatures confirm the indications that for long-time storage a temperature less than 50 deg. F. is necessary to prevent marked evidence of bacterial catabolism in many edible lots of egg powder. The moisture contents of these three samples were fairly comparable, being 4.63 percent for sample A, 4.84 percent for sample B, and 4.77 percent for sample C. The direct microscopic bacterial counts were 15,000,000, 3,000,000, and 7,500,000 per gram, respectively.

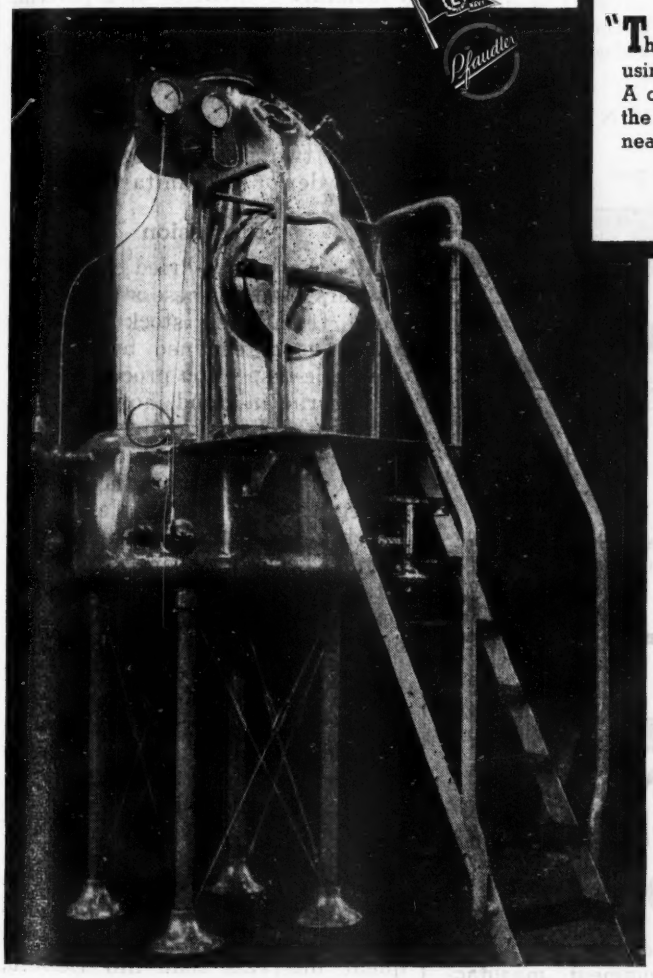
# VACUUM COOKING

## *Cuts preserving costs 50%*

**SAVINGS AND IMPROVED PRODUCTS LEAD TO PURCHASE OF SECOND PFAUDLER EVAPORATOR BY KIMBALL FOOD PRODUCTS CO.**

"The improvement in the quality of preserves since we started using the vacuum cooker has been outstanding.
A considerable saving has resulted in operating costs in relation to the old method. I would say the actual saving in labor would be near 50%."

C. B. Smith, *Manager*
KIMBALL FOOD PRODUCTS CO.
Fort Worth, Texas

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*At left: Model "C" Pfaudler Vacuum Pan which is designed for a charge of three barrels of cold pack fruit per batch (1500 to 1600 lbs.) plus necessary sugar. Modifications of this unit can be made to meet your exact requirements.*

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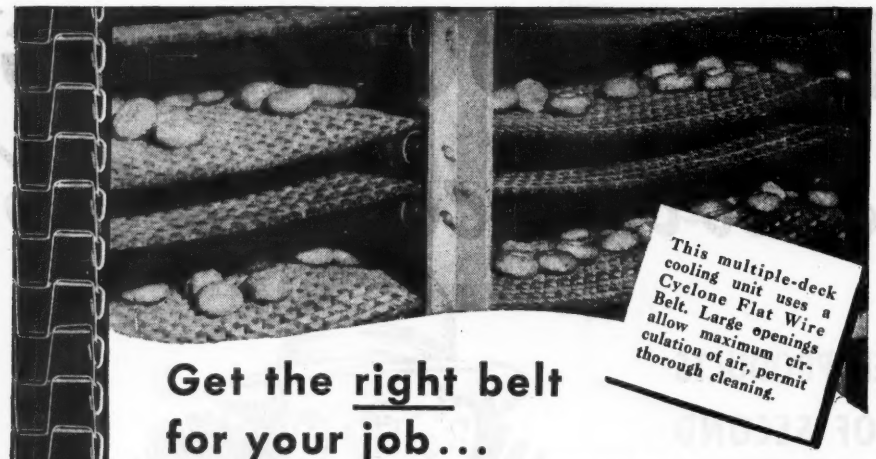

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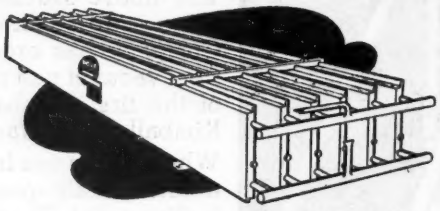

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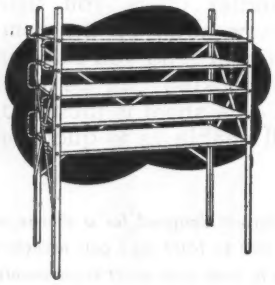

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From Fig. 5 it can be seen that all three logarithmic death-rate curves turn upward acutely at about 32 deg. F.

Fig. 2 shows that, at temperatures of 86 deg. F. and below, the primary rate of the bacterial catabolic changes in stored spray-dried whole-egg powder of high quality is not great. If the values for the two weeks' storage interval shown in Fig. 2 are plotted against the temperatures of storage, the curves plainly indicate that appreciable changes do not take place within this period at temperatures below 86 deg. F. (Fig. 6—curve for powder of high sanitary quality). On the other hand, results obtained with a powder of low sanitary quality, which had a direct microscopic count of more than 100,000,000 bacteria per gram, an initial viable cell count of 35,800,000 per gram, and a moisture content of 4.82 percent, suggest that to prevent marked changes it would probably be necessary to store this type of powder at a temperature lower than 86 deg. F., even for the relatively short period of two weeks (Fig. 6—curve for powder of low sanitary quality).

### Discussion

All the spray-dried whole-egg powders used in these studies were made from shell stock of edible grade, as determined by candling and table-inspection procedures. If it is borne in mind, however, that there is probably a direct relation between the bacteria count of freshly dried powders and the number of eggs of questionable quality which get into the mix in any commercial breaking operation, we can establish, tentatively at least, a direct agreement with the early work of DeBord,[1] in which quality was judged solely on the basis of candle grade. Thus, it appears that the results obtained in these studies completely confirm his early findings with respect to the influence of temperature and quality of the shell stock used on the extent of bacterial death in stored spray-dried whole-egg powders. By storing over a wider range of temperatures and sampling at more frequent intervals than did DeBord, we obtained data which can be analyzed on a logarithmic death-rate basis. The slope of the logarithmic death-rate curve provides an index to the rate of the catabolic processes going on in the bacterial cells. By analogy, these data are used as a tentative index to the rate of the chemical reactions taking place in the powder itself. Sec-

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ondary accelerated death rates shown by some of the logarithmic survival curves in these studies indicate strongly that there are chemical changes in the dried powder which hasten the normal course of cell catabolism, as well as lower the quality of the product. No information was obtained to indicate the nature of these changes.

### Summary

At temperatures of 86 deg. F. and below, bacterial death in samples of spray-dried whole-egg powder of high sanitary quality proceeded at a uniform logarithmic rate that was normal for bacterial populations of material stored in dry condition. There was even a small but progressive decrease in the number of viable bacterial cells at a temperature of 0 deg. F. The rate of cell death in this type of powder appears to be directly related to storage temperatures between 0 and 86 deg., but at 98 and 110 deg. there was a secondary accelerated death rate that was not normal for bacterial populations of material stored in dry condition.

In egg powders of low sanitary quality, there was a secondary accelerated death rate that was not normal for bacterial populations in material stored in dry condition, at a temperature as low as 86 deg. F.

These secondary accelerated death rates are attributed to extracellular factors resulting from chemical changes in the powder itself.

Evidence of advanced progress in bacterial cell catabolism appeared in powders of high sanitary quality when they were stored at or above 86 deg. F. for more than two weeks or at 50 deg. for more than 24 weeks.

With powders of low sanitary quality, evidence of the advanced progress of bacterial cell catabolism appeared when they were stored at or above 75 deg. F. for more than two weeks, at or above 50 deg. for more than 12 weeks, or at 32 deg. for more than 24 weeks.

The highest temperature at which spray-dried whole-egg powders of average sanitary quality could be stored for 48 weeks without showing pronounced evidence of bacterial cell catabolism was about 45 deg. F. A temperature of 32 deg. appeared to be considerably safer.

### References

1. George G. DeBord, Effect of Dehydration upon the Bacterial Flora of Eggs, *Journal of Agricultural Research*, vol. 31, No. 2, 155-164, 1925.
2. C. E. A. Winslow, The Rise and Fall of Bacterial Populations. Published as Chapter VI of "The Newer Knowledge of Bacteriology and Immunology," by

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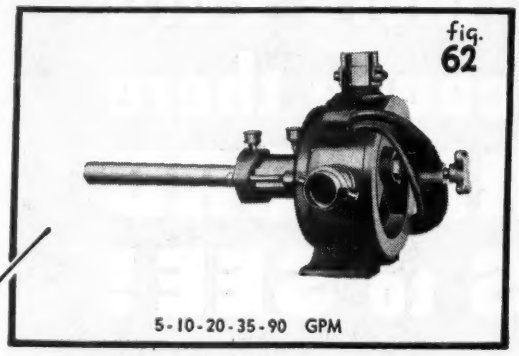


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E. O. Jordan and I. S. Falk, University of Chicago Press, Chicago, Ill., 1928.

3. Barnett Cohen, Disinfection Studies, *Journal of Bacteriology*, vol. 7, No. 2, 183-230, 1922.
4. L. S. Stuart, H. H. Hall and Edna E. Dicks, Storage Changes in Spray-Dried Whole-Egg Powder, *U. S. Egg and Poultry Magazine*, vol. 48, 629-33, 658, 1942.
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*—End—*

## How Tartrates Are Recovered

(*Continued from page* 108)

ed in the slop to coagulate and settle to the bottom of the tank. After settling, the supernatant liquor will be fairly free of solid matter, and this cleared portion is drawn off into a precipitating tank. This tank should be approximately the size of the daily output of distillery slop. A representative sample is then taken from the precipitating tank and is analyzed for the concentration of cream of tartar, and the gallonage of the material in the tank determined.

The next step is the precipitation procedure. The precipitants used are $CaCl_2$ and hydrated lime. In general practice, it is best to calculate the amount of commercial $CaCl_2$ on the basis of 0.5 lb. per pound of cream of tartar in the liquid to be precipitated. This figure is slightly higher than the theoretical requirement, but takes into consideration the purity of the commercial $CaCl_2$ of about 75 percent and allows for a 10 percent excess, which has proven to be good operational practice. The $CaCl_2$ is dissolved in water and the solution added to the contents of the precipitating tank. It is important that the addition of the $CaCl_2$ solution take place while thoroughly agitating the contents of the precipitating tank to assure uniform and overall distribution of the solution. After the addition of the chloride, a slurry of hydrated lime is added. The proportions of hydrated lime and water are approximately 150 lb. of lime per 50 gal. of water.

### pH Control

Although a calculated amount of lime may be added, practical experience has shown that it should be added to a definite pH value. This value will vary from 4.6 to 5.6, depending upon the cleanliness of the material and the concentration of cream of tartar. It is important that the lime slurry be added slowly, taking care that it is well dispersed by continued agitation, so

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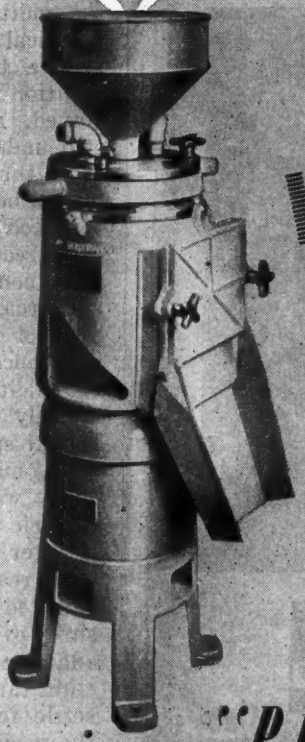

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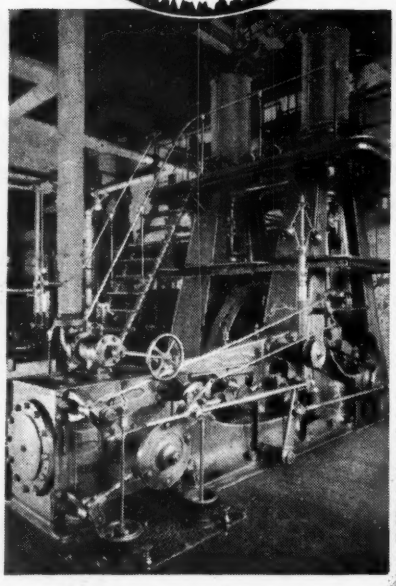

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that it will not settle to the bottom of the precipitating tank and its neutralizing action be limited thereby. Some time should elapse before determining the pH value of the material being precipitated after the addition of the lime. The most practical time to determine the pH is five to ten minutes after the addition of lime has been discontinued, although the material is still under agitation.

If the pH is low, more lime should be added, and the procedure repeated until the desired pH has been reached.

pH control is an important factor and greatly affects the purity of the product formed. It may mean the difference between a resultant lot of calcium tartrate which is extremely soft, subject to microbiological spoilage and of low purity, or a material of sandy texture, easily workable, clean and of high tartaric acid concentration.

After the desired pH point has been reached, the material is still agitated for 15 to 30 minutes to assure overall distribution of the added precipitants. Then the calcium tartrate formed is allowed to settle for from 6 to 12 hours. If the medium is clean and the initial cream of tartar concentration is close to 0.1 lb. per gallon, most of the calcium tartrate will settle within two to three hours. But if the liquid is not brilliantly clear the settling time will be considerably longer, as the suspended matter will prevent calcium tartrate crystals from settling immediately. It is good practice to allow at least six hours for settling before decanting the tank.

When the concentration of cream of tartar is over 0.1 lb. per gallon, there is danger that a large part of it might crystallize out of solution, should the temperature of the liquid fall below 90 deg. F. In this form it will not enter into the reaction by which calcium tartrate is produced.

The temperature of the material to be treated should be above the point where, at its given concentration, the cream of tartar will crystallize out.

When the calcium tartrate has settled, the supernatant liquor is drawn off and the precipitated calcium tartrate is washed out of the precipitating tank, with water, into a wash box.

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purities. Usually two or three washes are sufficient.

The clean calcium tartrate is thoroughly dried in a steam-jacketed dryer to a moisture content of below 5 percent to assure high purity and to avoid microbiological spoilage, which may occur if the moisture content be over this figure. A dryer of this type consists of a steam-jacketed stationary shell and a rotating shaft equipped with mixing paddles. During the drying operation the calcium tartrate is rendered to a fine powdered mass, after which it is sacked and ready for shipment.

Tartrates remaining in the mud in the settling tanks may be recovered by washing with hot water and drawn off when the tartrate content of the solution is below 0.02 lb. per gallon. This wash solution should be added to the first run portion of the clear settled-out material, and the calcium tartrate will be precipitated as outlined above.

After the last wash is decanted off the settled mud, a very heavy, paste-like material remains in the tank. It represents mostly pectins, proteins, pulp, various organic acids (malic, acetic, etc.), yeast cells and clarification materials. At present, the mud is discarded.

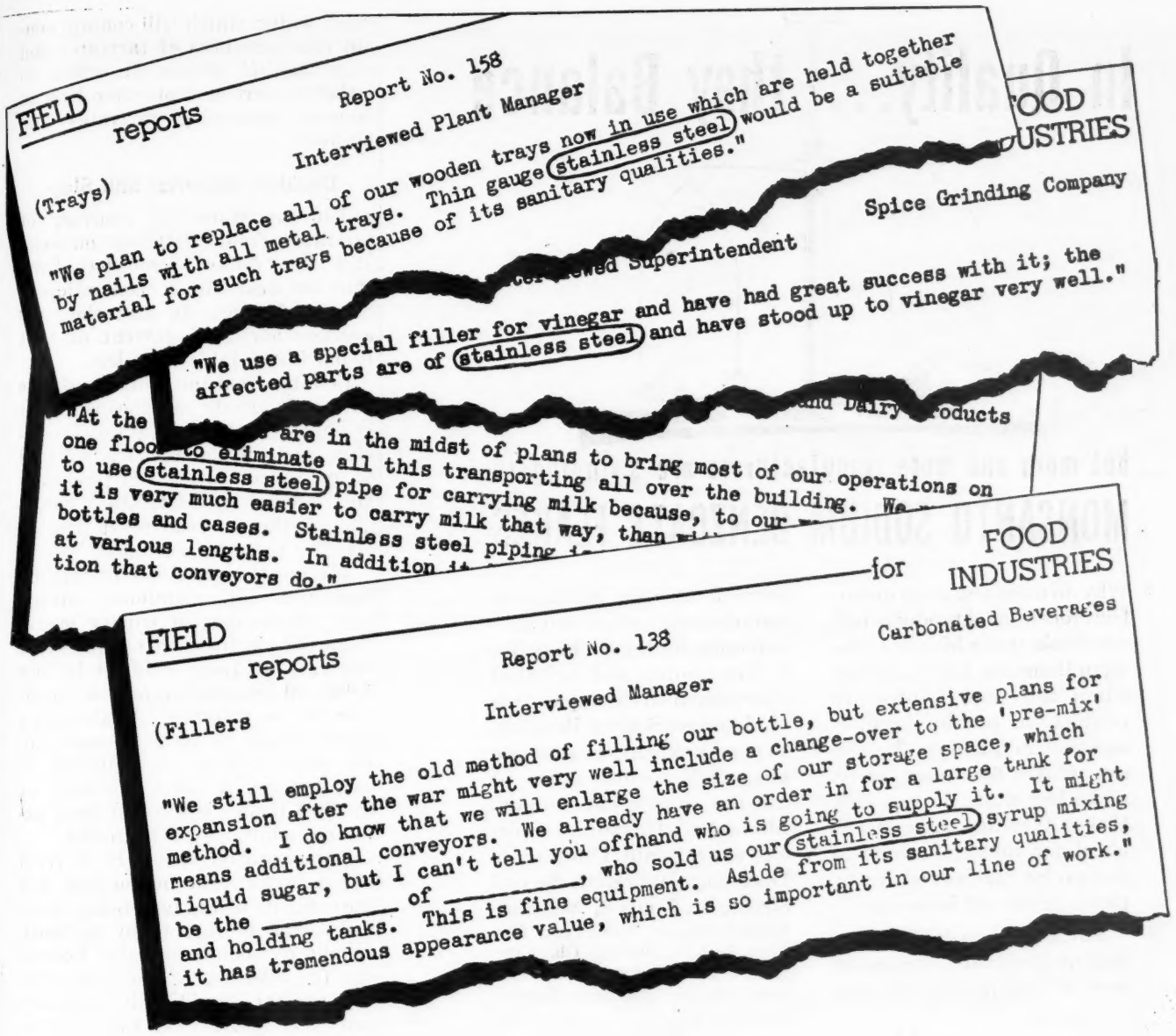
### Dessert Wine Lees

Dessert wine lees are richer in cream of tartar concentration than are those from table wine. Water should be added to these lees to dilute the tartrate concentration in order to avoid recrystallization of cream of tartar after distillation. Following distillation, nearly the same procedure is used as for table wine lees, the only difference being in the number of washes. Usually the material is washed three times but, if the concentration of the settled mud is still high, a fourth wash may be given.

To produce only cream of tartar from dessert wine lees, the first run liquid should be drawn off into tanks and the solution should be allowed to cool gradually to permit crystallization. The cream of tartar crystals are then collected, dried and shipped as crude argols. The mother liquor and washes will then be used for the production of calcium tartrate.

### Refrigeration Lees

The amount of lees from refrigerated wines is usually small. Being rich in cream of tartar, these lees should be washed with water, dried and converted to crude argols. The


FIELD reports
Report No. 158
Interviewed Plant Manager
(Trays)
"We plan to replace all of our wooden trays now in use which are held together by nails with all metal trays. Thin gauge stainless steel would be a suitable material for such trays because of its sanitary qualities."
FOOD INDUSTRIES
Spice Grinding Company
Superintendent
"We use a special filler for vinegar and have had great success with it; the affected parts are of stainless steel and have stood up to vinegar very well."
Dairy Products
"At the ... are in the midst of plans to bring most of our operations on one floor to eliminate all this transporting all over the building. We ... to use stainless steel pipe for carrying milk because, to our ... it is very much easier to carry milk that way, than ... bottles and cases. Stainless steel piping ... at various lengths. In addition it ... tion that conveyors do."
FOOD INDUSTRIES
FIELD reports
Report No. 138
Carbonated Beverages
(Fillers
Interviewed Manager
"We still employ the old method of filling our bottle, but extensive plans for expansion after the war might very well include a change-over to the 'pre-mix' method. I do know that we will enlarge the size of our storage space, which means additional conveyors. We already have an order in for a large tank for liquid sugar, but I can't tell you offhand who is going to supply it. It might be the _____ of _____, who sold us our stainless steel syrup mixing and holding tanks. This is fine equipment. Aside from its sanitary qualities, it has tremendous appearance value, which is so important in our line of work."

# Food Industries' Field Reports Emphasize Trend to Stainless

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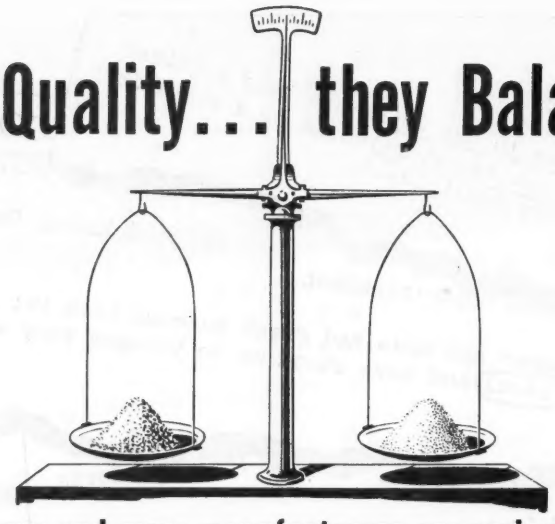

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wash water, which will contain considerable amounts of tartrates and some alcohol, should be added to either dessert or table wine lees, to recover remaining tartrates and alcohols.

### Distilling Material Still Slop

The procedure for recovery of tartrates from distilling material still slop differs somewhat from that for lees. The concentration of cream of tartar in still slop will average about 25 percent of that found in the table wine lees.

Coming from the still, the slop is extremely cloudy in appearance. It is impossible to precipitate the calcium tartrate out of such a liquid of low concentration and produce a good quality product. As a consequence, the material must first be clarified prior to treatment.

Clarification is done by adding bentonite (an aluminum silicate used extensively in winery operations for clarification of wines) at the rate of from 5 to 10 lb. per 1,000 gal., depending on the condition of the material. A laboratory check should be made to ascertain the least amount of bentonite to use, because a lower recovery of clarified liquids will result from excessive additions of bentonite.

The coagulant should be slurried either in water or in the slop, and the contents of the tank being clarified should be thoroughly agitated, usually by compressed air. Following the addition of the bentonite, the unclear liquid will coagulate and clear portion of the clarified slop will appear.

Hot distillery slops generally clarify very readily, so that a settling period of from four to eight hours after the addition of bentonite is sufficient. The clarified material is usually clean and brilliant in appearance.

It seems that better results are obtained by clarifying the material after distillation, although some operators prefer to add bentonite before.

The slop will clarify up to 90 percent of its original volume if properly handled. When the clarification is complete, the clear portion is pumped to the precipitating tank. An analysis of the liquid is determined, and the precipitation is carried out along the same line as that for lees. However, special care should be taken toward the end point. A slight excess of lime will tend to bring the pH up to a point where other-than-tartrate-matter will precipitate out, producing poor product. In exception-

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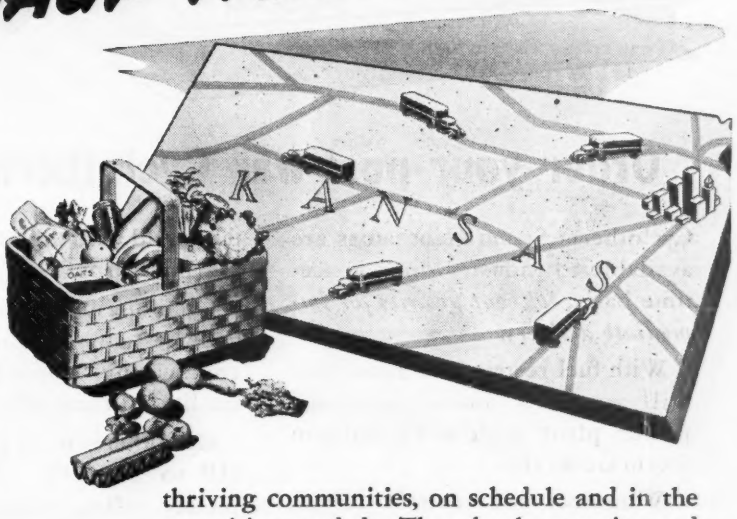


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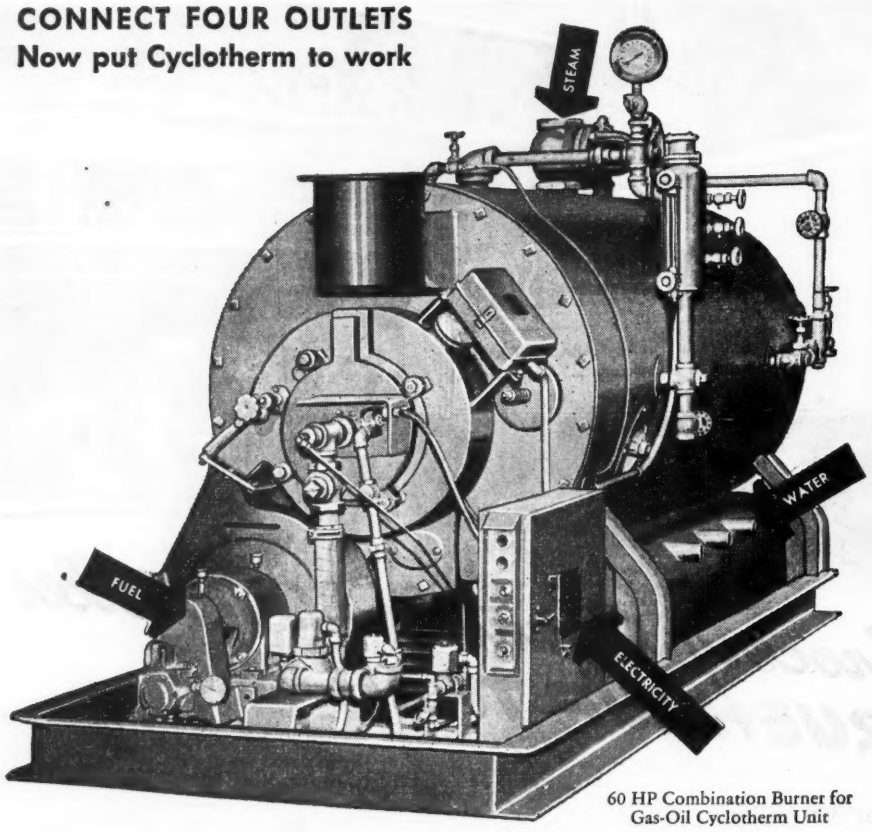


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ally clear media, the pH should not go over 5.6. Some operators recommend a pH of 4.5, but it seems that best recovery is made at a pH of 5.0.

Since the concentration of cream of tartar is at times as low as 0.02 lb. per gallon, the weight of calcium tartrate recovered in one precipitation is rather small, so care should be taken to obtain the optimum pH point.

*This report on the recovery of tartrates from winery wastes will be concluded in the November issue of* FOOD INDUSTRIES. *In the second part, the author discusses chemical principles and economics.*—THE EDITORS.

*—End—*

## The Vacreator

(*Continued from page* 81)

form of vacuum pasteurization and oxygen removal, less change occurs in the important milk constituents. Results of studies made by workers in widely separated localities are accumulating to indicate that in the vacreation of milk and milk products there evidently arises less chemical change and damage and that there is protection of food value and natural flavor and an enhancement of keeping quality.

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